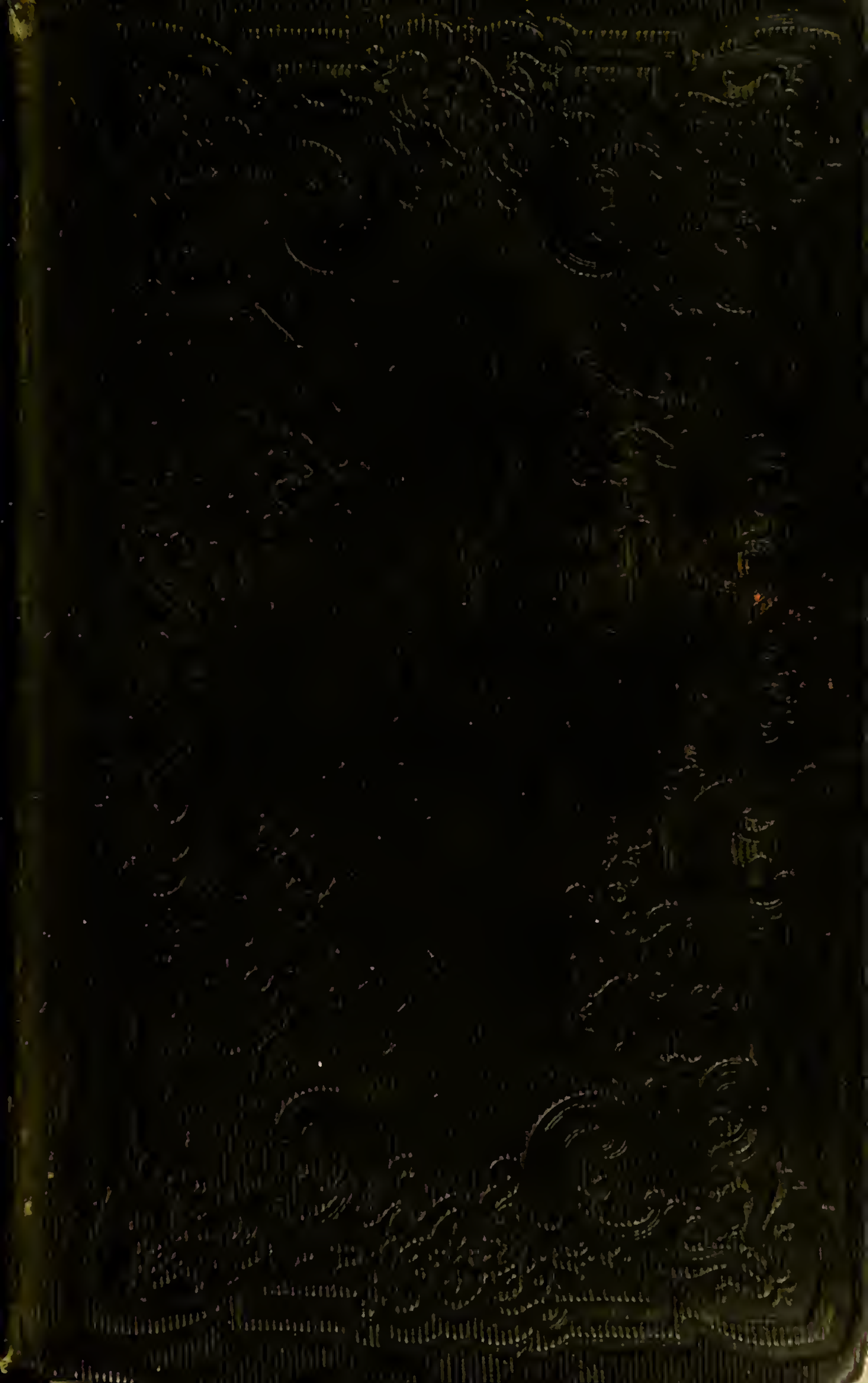

PRESENTED

BY

J A Nunneley Esq.
1900

ANATOMICAL TABLES

OF THE

MUSCLES, LIGAMENTS, FASCIÆ, BLOOD VESSELS,

AND

NERVES.

ANATOMICAL TABLES;

CONTAINING

CONCISE DESCRIPTIONS

OF THE

MUSCLES, LIGAMENTS,
FASCIÆ, BLOOD VESSELS,

AND

NERVES.

INTENDED FOR THE USE OF STUDENTS.

BY

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PREFACE.

This little volume is not published with the wish or intention that it should, in the least, usurp the place of those more extended and valuable books, which are usually in the possession of the anatomical student, but to supply what the author, when a student himself felt, and what he has observed students in general feel, the want of some concise manual which may be referred to after more elaborate and extensive works have been studied. These tables alone are not intended to teach anatomy, but to assist in the understanding and recollection of it.

Descriptive anatomy, the complete knowledge of which is so essential to the practitioner, consists of a series of facts, not isolated, nor unconnected, it is true, but nevertheless such, that many of them are very apt to escape the memory, until by long attention and repetition they have become fixed in it. There are few who have paid due attention to anatomy, who, during their studies, have not felt the necessity of constructing for themselves tables, or short-hand references, on the leading points of what they had gone over, to which they could always refer, with the certainty of not only that which is set down becoming at once plain and intelligible, but also that much more would be brought before the memory; in the same manner as a sketch of the principal features in a forgotten landscape immediately brings the whole scene vividly before the mind.

While it may be well to remind the young student that anatomy cannot be properly learnt from books alone, (an idea which unfortunately appears to be gaining ground), and that the only way to acquire a permanent and practical knowledge of it, is for each individual to sit down, scalpel in hand, and dissect for himself; on the other hand, it must not be forgotten, that in order to generalise and render useful in practice the information thus obtained, very considerable assistance is to be derived from lectures and reading.

In the construction of this work one great object has been, that while nothing important on those subjects of which it professes to treat should be omitted; yet, that its size should be such that it may easily be carried about. Occasions frequently arise that a small work would be referred to, when a large work could or would not be consulted; and there are many spare minutes (as between lectures, &c.) which might often be profitably employed by the practice of carrying such books as may readily be consulted, especially such as contain facts, where no lengthened train of reasoning is required, which must necessarily be destroyed by broken and interrupted applications. It is for this reason that the Viscera are not introduced; any description of them, to be useful, must be of considerable length, as their importance depends, not so much upon mere outward forms, as upon their minute texture and relative connections. The Bones are not described, partly because there already exists more than one manual on them, and it would be impossible to have given a description of them, which should be good for any thing, without considerably extending the size of the book. The manner in which the attachment of muscles to individual bones is given, will, it is presumed, be sufficient to call up a tolerably perfect recollection of them; but, above all, a single glance at the bones themselves, (which every student ought to possess or have access to,) will do more than a lengthened description could. The muscles are presented in more than one tabular form; to understand the muscular system well is considerably more difficult than any other part of anatomy; it, however, repays any application, not only on account of its own importance, but also, because this understood, the course and distribution of the Blood Vessels and Nerves are most easily comprehended.

Though this book is more particularly intended for those who have paid some degree of attention to anatomy, it is not improbable that the student who is about entering upon the study might find it useful as an introduction; and it is thought, in the dissecting room it may be consulted not without advantage, by impressing the dissections in a clearer and more definitive manner upon the memory. Lengthened descriptions of the connections and relative anatomy of parts under dissection are much better fitted for study at home, than by the dissecting table, *where the subject itself should be considered,* whereas short references are not only useful, but often absolutely necessary to assist the memory at the moment, respecting the part under the eye.

September, 1838.

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ERRATA.

THROUGH INADVERTANCE SOME SLIGHT ERRORS HAVE UNFORTUNATELY ESCAPED CORRECTION.

Page 3, for *Trachleo,* read *Trachelo.*
12, for *thirty three,* read *thirty four.*
16, the words *Sterno Hyoideus* and *Sterno Thyroideus,* should be in italic.
18, the words *Biceps Flexor Cubiti,* should not be in italic.
20, line 2, the word *Brevis,* should be in italic.
26, for *crusis* read *cruris.*
28, 29, for *perinæi* read *peronæi.*
29, for *astraglaus* read *astragalus.*

ATTACHMENT OF MUSCLES

TO PARTICULAR BONES.

BONES OF THE HEAD AND FACE.

The Ethmoid, Lachrymal, Vomer, and Turbinate Bones, have not any muscles attached to them.

*The Frontal Bone has on each side the median line three muscles attached to it; they all arise.

Arise the

Temporalis,

Orbicularis Palpebrarum,

Corrugator Supercilii.

The Orbicularis Palpebrarum and Corrugator Supercilii arise from the internal angular process;

---

* I use the terms origin and insertion, not because I think they are either very precise or strictly accurate, or that one tissue can ever in fact be said to arise from a totally different tissue, but because they are generally so employed; and perhaps, after all, convey more concisely what is intended than any other expressions do. For though no unexceptional general rule can be laid down why one attachment of a muscle should be called its origin rather than another, as that which in most cases is the fixed point frequently becomes the moveable, and though that which is called

the Temporalis behind the external angular process. The Occipito Frontalis is sometimes said to be inserted into the frontal bone, but it is rather inserted into the integuments with the Orbicularis and Corrugator than into the bone. The pulley round which the superior oblique muscle of the eye plays, is attached to the internal angular process.

The PARIETAL BONE has only one muscle attached; it arises.

The Temporalis.

The TEMPORAL BONE has sixteen muscles attached; of these thirteen arise, three are inserted.

Arise the
Occipito Frontalis,
Attrahens Aurem,
Retrahens Aurem,
Temporalis,
Masseter,

the origin of a muscle is in general less tendinous than the insertion, the reverse often is seen, consequently the two alleged distinctions between the origin and insertion of a muscle not by any means of universal application; yet I consider the term attachment, to render it definite, requires so many different explicatives (as superior, inferior, internal, external, posterior, anterior, &c.) that it involves the use of longer explanations, or not more accurate expressions, than the old words origin and insertion.

The muscles are enumerated, as far as possible, in the order of their attachment, and those which have only a partial origin or insertion into individual bones are put in italics.

Digastricus,
Stylo Hyoideus,
Stylo Glossus,
Stylo Pharyngeus,
Levator Palati,
Constrictor Pharyngis Superior,
Stapedius,
Tensor Tympani:

Inserted the

Sterno Cleido Mastoideus,
Splenius Capitis,
Trachleo Mastoideus.

The Temporalis is attached to the squamous portion of the bone; the Attrahens Aurem and Masseter to the zygoma; the Occipito-frontalis, Sterno-mastoideus, Splenius Capitis, and Trachleo-mastoideus, to the mastoid process; the Digastricus to the digastric fossa; the three Styloid Muscles to the styloid process; the Superior Constrictor of the Pharynx, Tensor Tympani, and Levator Palati, to the petrous bone; and the Stapedius, within the Tympanum, to the pyramid.

The Occipital Bone has on each side the median line thirteen muscles attached to it; of these two arise, eleven are inserted.

Arise the

Occipito Frontalis,
Trapezius:

Inserted the

Constrictores Pharyngis, Superior et Inferior,
Recti Capitis Antici, Major et Minor,
Rectus Capitis Lateralis,
Sterno Cleido Mastoideus,
Splenius Capitis,
Complexus,
Recti Capitis Postici, Major et Minor,
Obliquus Capitis Superior.

The Occipito-frontalis and Sterno-mastoideus are attached to the two outer thirds, the Trapezius to the inner third, of the superior transverse ridge; the Complexus, Splenius, and Obliquus superior to the inter-transverse space; the Rectus Posticus major to the inferior transverse ridge; the Rectus Posticus minor, between it and the foramen magnum; the Rectus Lateralis to the jugular process; the Recti Antici, major et minor, with the Constrictores Pharyngis, superior et inferior, to the basilar process.

The SPHENOID BONE. Thirteen muscles are attached to this bone on each side the median line, all of which arise from it.

Arise the

Levator Palpebræ Superioris,
Obliquus Superior, and four Recti of the eye,
Buccinator,
Temporalis,
Pterygoidei, *Externus et Internus,*
Laxator Tympani,

Circumflexus Palati,
Constrictor Pharyngis Superior.

The Levator Palpebræ and five Muscles of the Eye are attached round the foramen opticum; the Temporalis to the greater wing; the Pterygoideus Externus and Buccinator to the external pterygoid plate; the Pterygoideus Internus to the pterygoid fossa; the superior Constrictor of the Pharynx to the internal pterygoid plate; the Laxator Tympani to the spinous process; and the Circumflexus Palati to the styloid process and fossa navicularis.

The **Nasal Bone.** No muscles arise from this bone; two are usually said to be inserted into it, but they are rather attached to the nasal cartilages and integuments than to the bones.

Pyramidalis Nasi,
Compressor Nasi.

The **Malar Bone** has four muscles attached, all of which arise from it.

Arise the
Zygomatici, Major et Minor,
Masseter,
Temporalis.

The Zygomatici are attached to the anterior surface of the bone; the Masseter to the inferior margin; and the Temporalis to the posterior surface.

The Superior Maxillary Bone has ten muscles attached, all of which arise from it.

Arise the

Orbicularis Palpebrarum,
Obliquus Inferior Oculi,
Levator Labii Superioris Alæque Nasi,
Levator Anguli Oris,
Compressor Nasi,
Masseter,
Depressor Labii Superioris Alæque Nasi,
Buccinator,
Constrictor Pharyngis Superior,
Pterygoideus Externus.

The Orbicularis Palpebrarum is attached to the nasal process; the Inferior Oblique to the orbital plate; the Levator Labii Superioris Alæque Nasi to the nasal process and margin of orbit; the Depressor Labii Superioris Alæque Nasi and Buccinator to the alveolar process; the Levator Anguli Oris, and Compressor Nasi to the canine fossa; the Masseter to the malar process; the Constrictor Pharyngis Superior to the last portion of the alveolar process; and the Pterygoideus Externus to the back of the tuberosity.

* * *

The Palate Bone has four muscles attached to it; of these three arise, one is inserted.

Arise the

Pterygoidei, Externus et Internus,
Azygos Uvulæ:

Inserted the

Circumflexus Palati.

The Pterygoideus Externus is attached to the outer surface, the Pterygoideus Internus to the inner surface of the pterygoid process; the Azygos Uvulæ to the posterior extremity of the spine; and the Circumflexus Palati to the posterior edge of the bone.

The Inferior Maxillary Bone has on each side the symphysis fourteen muscles attached to it; of these eight arise, six are inserted.

Arise the

Depressor Labii Inferioris,
Depressor Anguli Oris,
Levator Labii Inferioris,
Buccinator,
Genio Hyoideus,
Mylo Hyoideus,
Genio Hyo Glossus,
Constrictor Pharyngis Superior :

Inserted the

Platysma Myoides,
Digastricus,
Masseter,
Temporalis,
Pterygoidei, Externus et Internus.

The Platysma Myoides and Depressor Labii Inferioris are attached to the side and front of the lower jaw; the Depressor Anguli Oris to the external oblique line; the Levator Labii Inferioris and Buccinator to the alveolar process; the Masseter to the external surface of the angle, and the Pterygoideus Internus to the internal surface; the Temporalis to the Coronoid process; the Pterygoideus Externus to the neck and condyloid process; the Mylo-hyoideus and Constrictor Pharyngis Superior to the inner oblique line; the Digastricus and Genio-hyoideus to the lower of the two tubercles on the inner surface of the symphysis; and the Genio-hyo-glossus to the upper tubercle.

The Os Hyoides has on each side the median line ten muscles attached; of these two arise, and eight are inserted.

Arise the

Hyo Glossus,
Constrictor Pharyngis Medius:

Inserted the

Sterno Hyoideus,
Thyro Hyoideus,
Omo Hyoideus,
Digastricus,
Stylo Hyoideus,
Mylo Hyoideus,
Genio Hyoideus,
Genio Hyo Glossus.

The Sterno-hyoideus is attached to the anterior surface of the body of the Os Hyoides; the Digastricus, Stylo-hyoideus, Mylo-hyoideus, Genio-hyoideus, Hyo-glossus, and Genio-hyo-glossus, to the upper border of the body and cornua; the Constrictor Pharyngis Medius, Omo-hyoideus, and Mylo-hyoideus to the lower border.

VERTEBRÆ.

On each side of the Vertebral Column forty-four muscles are attached, of which twenty-seven arise from it, two are inserted into it, and fifteen both arise from, and are inserted into it.

Arise the

Recti Capitis Antici, Major et Minor,
Rectus Capitis Lateralis,
Scaleni, Anticus, Medius, et Posticus,
Crus of the Diaphragm,
Psoæ, Magnus et Parvus,
Iliacus Internus,
Obliquus Internus Abdominis,
Transversalis Abdominis,
Trapezius,
Latissimus Dorsi,
Rhomboidei, Major et Minor,
Serrati Postici, Superior et Inferior,
Sacro Lumbalis,
Levator Anguli Scapulæ,
Splenius Capitis,
Trachleo Mastoideus,

Complexus,
Recti Capitis Postici, Major et Minor,
Obliquus Capitis Superior,
Levatores Costarum:

Inserted the

Cervicalis Ascendens,
Quadratus Lumborum:

Both arise from and inserted into the Vertebral Column, the

Longus Colli,
Longissimus Dorsi,
Spinalis Dorsi,
Splenius Colli,
Transversalis Colli,
Semi Spinalis Colli,
Semi Spinalis Dorsi,
Obliquus Capitis Inferior,
Multifidi Spinæ,
Inter-transversales Colli, Dorsi, et Lumborum,
Inter-spinales Colli, Dorsi, et Lumborum.

Of these muscles those placed on the bodies of the Vertebræ, anterior to the transverse processes, are the

Recti Capitis Antici, Major et Minor,
Longus Colli,
Crus of the Diaphragm,
Psoæ, Magnus et Parvus:

Those placed at the lateral parts of the column are the

Rectus Capitis Lateralis,

Scaleni, Anticus, Medius, et Posticus,
Obliquus Internus Abdominis,
Transversalis Abdominis,
Iliacus Internus,
Quadratus Lumborum,
Levatores Costarum,
Inter-transversales Colli, Dorsi, et Lumborum.

The remaining muscles of the Vertebræ are all placed upon the posterior part of the column.

PELVIS.

The Sacrum has on each side the median line seven muscles attached to it; of these six arise, one is inserted.

Arise the
Latissimus Dorsi,
Sacro Lumbalis,
Longissimus Dorsi,
Multifidus Spinæ,
Glutæus Maximus,
Pyriformis:
Inserted the
Coccygeus.

The Glutæus Maximus, Latissimus Dorsi, Sacro-lumbalis, and Longissimus Dorsi, are attached to the posterior surface; the Multifidus Spinæ to the upper false transverse process; the Pyriformis to the anterior surface; and the Coccygeus to the lower part of the sacrum.

The Coccyx has attached on each side four muscles; of which two arise and two are inserted.

Arise the

Glutæus Maximus,
Sphinter Ani Externus:

Inserted the

Coccygeus,
Levator Ani.

The Glutæus Maximus and Coccygeus are attached to the side of the coccyx; the Sphinter and Levator Ani to its apex.

The Os Innominatum has thirty-three muscles attached; thirty-two arise, two are inserted, and also two of those which arise are partially inserted into it.

Arise the

Obliquus Internus Abdominis,
Transversalis Abdominis,
Rectus Abdominis,
Pyramidalis,
Latissimus Dorsi,
Sacro Lumbalis,
Longissimus Dorsi,
Quadratus Lumborum,
Iliacus Internus,

Glutæi, *Maximus*, Medius, et Minimus,
Tensor Vaginæ Femoris,
Sartorius,
Rectus Femoris,
Pectineus,
Gracilis,
Triceps Adductor Femoris,
Obturatores, Externus et Internus,
Levator Ani,
Coccygeus,
Pyriformis,
Gemelli, Superior et Inferior
Quadratus Femoris,
Biceps Flexor Cruris,
Semi Membranosus,
Semi Tendinosus,
Transversus Perinæi
Transversus Perinæi Alter,
Erector Penis vel Clitoridis :

Inserted the

Psoas Parvus,
Obliquus Externus Abdominis,
Obliquus Internus et Transversalis Abdominis.

The Obliquus Externus Abdominis is attached to the anterior half of the outer lip of the crista Ilii, the Latissimus Dorsi to the posterior third ; the Obliquus Internus to the anterior two-thirds, the Sacro-lumbalis and Longissimus Dorsi to the posterior third of the space between the lips ; the Tranversalis Abdominis to the anterior three-fourths, the Quadratus

Lumborum to the posterior fourth of the inner lip of the crista ilii; the Iliacus Internus to the inner surface of the wing; the Pyriformis to the upper and back part of the same surface; the Glutæus Maximus to the posterior roughened space on the outer surface of the wing; the Glutæus Medius to the space between the crista and semi-circular ridge; the Glutæus Minimus below this ridge; the Tensor Vaginæ and Sartorius to the superior anterior spinous process; and the Rectus Femoris to the inferior anterior spinous process, and to the bone below it.

The Rectus Abdominis, Pyramidalis, and the combined tendons of the Internal Oblique and Transversalis muscles, are attached to the crista of the Pubis, the latter also to the ileo-pectineal line; the Obliquus Externus to the spine and ileo-pectineal line; the Psoas Parvus to the same line; the Pectineus to the bone immediately anterior to the line; the Gracilis close to the symphysis; the Adductors Longus and Brevis to the fore part of the body of the pubis; the Adductor Magnus to the rami of the pubis and ischium, also to the tuberosity of the latter; the Obturator Externus to the outer margin of the obturator foramen; the Obturator Internus to the inner margin; the Levator Ani to the inner surface of the pubis and ischium.

The Coccygeus and Gemellus Superior are attached to the spine of the Ischium; the Transversus Perinæi, Transversus Perinæi Alter, and Erector Penis to the ramus ischii; the Gemellus Inferior, Quadratus Femoris, long head of Biceps, Semi-membranosus, and Semi-tendinosus, to the tuber ischii.

STERNUM AND RIBS.

The Sternum has attached to it on each side the median line eleven muscles; of which seven arise, four are inserted.

Arise the

Pectoralis major
Sterno Cleido Mastoideus,
Sterno Hyoideus,
Sterno Thyroideus,
Sterno Costalis,
Inter-costales Interni
Diaphragma:

Inserted the

Obliqui, Externus et Internus, } by the Linea
Tranversus Abdominis, } Alba.
Rectus Abdominis.

The Pectoralis Major is attached to the anterior surface of the sternum; the Sterno-cleido-mastoideus to the upper part of the first bone; the Sterno-hyoideus and Sterno-thyroideus to the posterior surface of the first bone; the Inter-costales-interni and Sterno-costalis to the posterior surface and edge of the sternum; the Diaphragm to the posterior surface of the ensiform cartilage; the Obliqui Externus et

Internus, Transversalis, and Rectus Abdominis, to the ensiform cartilage.

The Ribs have twenty-six muscles attached to them, of which twelve arise, twelve are inserted, and two both arise from and are inserted into them.

Arise the

Pectorales, *Major* et Minor,
Serratus Magnus,
Latissimus Dorsi,
Accessorii ad Sacro Lumbalem,
Cervicalis Ascendens,
Obliquus Externus Abdominis,
Transversalis Abdominis,
Diaphragma,
Subclavius,
Sterno Hyoideus,
Sterno Thyroideus :

Inserted the

Obliquus Internus Abdominis,
Rectus Abdominis,
Sterno Costalis,
Scaleni, Anticus, Medius, et Posticus,
Serrati Postici, Superior, et Inferior,
Sacro Lumbalis,
Longissimus Dorsi,
Levatores Costarum,
Quadratus Lumborum.

The Inter-costales Externi et Interni both arise from and are inserted into the edges of the ribs.

The Pectoralis Major is attached to the cartilages of the third, fourth, fifth, and sixth ribs; the Pectoralis Minor to the third, fourth, and fifth ribs; the Obliquus Externus to the external surface of the cartilages of the eight inferior ribs; the Obliquus Internus, Transversalis, and Diaphragm, to the cartilages of the six inferior ribs; the Rectus to the cartilages of the fifth and sixth ribs; the Serratus Magnus to the eight or nine superior ribs; the Subclavius and Sterno-hyoideus to the first rib; the Sterno-thyroideus to the cartilage of the second rib; the Scalenus Anticus to the first rib; the Scaleni Medius et Posticus to the second rib; the Quadratus Lumborum to the last rib; the Latissimus Dorsi to the four inferior ribs; the Serratus Posticus superior to the second, third, and fourth ribs; the Serratus Posticus inferior to the four inferior ribs; the Sacrolumbalis, with its accessory muscles, to the angles of all the ribs; the Longissimus Dorsi and Levatores Costarum, near to the tubercles of all the ribs; and the Cervicalis Ascendens to the four or five superior ribs behind their angles.

UPPER EXTREMITY.

The Clavicle has six muscles attached to it; of which four arise, two are inserted.

Arise the

Sterno Cleido Mastoideus,
Sterno Hyoideus,
Pectoralis Major,
Deltoides:

Inserted the

Trapezius,
Subclavius.

The Pectoralis Major is attached to the sternal part of the anterior border of the Clavicle; the Deltoides to the acromial portion of the same border; the Sterno-cleido-mastoideus to the sternal part of the posterior border; the Trapezius to the acromial end of the same border; the Sterno-hyoideus to the sternal extremity; and the Subclavius to the under surface of the clavicle.

The Scapula has seventeen muscles attached to it; of these eleven arise, six are inserted.

Arise the

Deltoides,
Omo Hyoideus,
Supra Spinatus,
Infra Spinatus,
Teretes, Major et Minor,
Triceps Extensor Cubiti, (long head)
Latissimus Dorsi,
Coraco Brachialis,
Biceps Flexor Cubiti,
Subscapularis :

Inserted the

Trapezius,
Pectoralis Minor,
Levator Anguli Scapulæ,
Rhomboidei, Major et Minor,
Serratus Magnus.

The Deltoides and Trapezius are attached to the spine and acromion; the Pectoralis Minor, short head of Biceps, and Coraco-brachialis, to the coracoid process; the long head of the Biceps to the upper margin of the glenoid cavity; the Omo-hyoideus to the superior border near the notch; the Levator Anguli Scapulæ to the upper part of the posterior border; the Rhomboidei, Major et Minor, and Serratus Magnus to the posterior border; the Latissimus Dorsi to the inferior angle; the long head of the Triceps, Teretes, Major et Minor, to the inferior border; the Supra Spinatus to the supraspinal fossa; the Infra Spinatus to the infraspinal fossa; and the Subscapularis to the subscapular fossa.

The HUMERUS has twenty-four muscles attached to it; of which fifteen arise, nine are inserted.

Arise the

Triceps, (second and third heads)
Brachialis Anticus,
Pronator Radii Teres,
Flexor Carpi Radialis,
Palmaris Longus,
Flexor Communis Digitorum Sublimis,

Flexor Carpi Ulnaris,
Supinatores Radii, Longus et Brevis,
Extensores Carpi Radiales, Longus et Brevis,
Extensor Communis Digitorum,
Extensor Minimi Digiti,
Extensor Carpi Ulnaris,
Anconæus:

Inserted the

Deltoides,
Supra Spinatus,
Infra Spinatus,
Teres Minor,
Subscapularis,
Pectoralis Major,
Teres Major.
Latissimus Dorsi,
Coraco Brachialis.

The Supra et Infra Spinati and Teres Minor are attached to the greater tubercle; the Subscapularis to the lesser tubercle; the Pectoralis Major, Teres Major, and Latissimus Dorsi, to the margin of the bicipital groove; the second and third heads of the Triceps to the posterior surface of the bone; the Brachialis Anticus to the anterior surface; the Coraco-brachialis and Deltoides near to the middle of the bone; the Supinator Radii Longus and Extensor Carpi Radialis Longus to the external intermuscular ridge; the Extensor Carpi Radialis Brevis, Extensor Communis, Extensor Minimi Digiti, Anconæus, and Supinator Brevis, to the external condyle; the Pronator Radii Teres, Flexor Carpi Radialis, Palmaris Longus, Flexor Communis Sublimis, and Flexor Carpi Ulnaris, to the inner condyle.

The Ulna has fifteen muscles attached to it; of which twelve arise, three are inserted.

Arise the

Pronator Radii Teres,
Flexor Communis Digitorum Sublimis,
Flexor Carpi Ulnaris,
Flexor Longus Pollicis,
Flexor Communis Digitorum Profundus,
Pronator Quadratus,
Supinator Radii Brevis,
Extensor Carpi Ulnaris,
Extensor Ossis Metacarpi Pollicis,
Extensores Primi et Secundi Internodii Pollicis,
Extensor Indicis:

Inserted the

Brachialis Anticus,
Triceps Extensor,
Anconæus.

The Brachialis Anticus, Pronator Radii Teres, Flexor Communis Sublimis, and Flexor Longus Pollicis, are attached to the coronoid process; the Flexor Communis Profundis, Flexor Carpi Ulnaris, and Pronator Quadratus, to the fore part of the bone; the Triceps to the olecranon process; the Anconæus and Supinator Radii Brevis to the posterior surface immediately below the olecranon process; the Extensor

Carpi Ulnaris, Extensores, Ossis Metacarpi, Primi et Secundi, Internodii Pollicis, and Extensor Indicis, to the posterior surface of the ulna.

The Radius has nine muscles attached to it; of which four arise, five are inserted.

Arise the

Flexor Digitorum Sublimis,
Flexor Longus Pollicis,
Extensor Ossis Metacarpi Pollicis,
Extensor Primi Internodii Pollicis:

Inserted the

Biceps,
Pronator Radii Teres,
Supinator Radii Brevis,
Supinator Radii Longus,
Pronator Quadratus.

The Biceps is attached to the tubercle of the Radius; the Supinator Brevis, Flexor Digitorum Sublimis, Flexor Longus Pollicis, and Pronator Quadratus, to the fore part of the bone; the Pronator Radii Teres to the outer and back part of the centre of the bone; the Supinator Radii Longus to the outer surface near the styloid process; the Extensor Ossi Metacarpi and Extensor Primi Internodii Pollicis to the posterior surface about the middle of the bone.

The Scaphoid, Lunar, and Cuneiform Bones have not any muscles attached to them.

The PISIFORM BONE has two muscles attached to it; of which one arises, the other is inserted.

Arises the
Abductor Minimi Digiti:
Inserted the
Flexor Carpi Ulnaris.

The TRAPEZIUM has five muscles attached to it; of which four arise, and one is inserted.

Arise the
Abductor Pollicis,
Opponens Pollicis.
Flexor Brevis Pollicis,
Abductor Indicis:
Inserted the
Extensor Ossis Metacarpi Pollicis.

The TRAPEZOID. One muscle partly arises from this bone.

Flexor Brevis Pollicis.

The MAGNUM. One muscle partly arises from this bone.

Flexor Brevis Pollicis.

The UNCIFORM BONE. Two muscles arise from this bone.

Flexor Brevis Minimi Digiti,
Adductor Minimi Digiti,

The METACARPAL BONE of the thumb has three muscles attached to it; of which one arises, two are inserted.

Arises the

Abductor Indicis:

Inserted the

Extensor Ossis Metacarpi Pollicis,

Opponens Pollicis.

The Metacarpal Bones of the four fingers have the Inter-ossei attached to them, in addition to which

The Metacarpal Bone of the index finger has three muscles attached; of which one arises, two are inserted.

Arises the

Abductor Indicis:

Inserted the

Flexor Carpi Radialis,

Extensor Carpi Radialis Longus.

The Metacarpal Bone of the middle finger has two muscles attached; of which one arises, the other is inserted.

Arises the

Adductor Pollicis:

Inserted the

Extensor Carpi Radialis Brevis.

The Metacarpal Bone of the little finger has three muscles inserted into it, the

Extensor Carpi Ulnaris,
Flexor Carpi Ulnaris,
Adductor Minimi Digiti.

The first PHALANX and SESAMOID Bones of the thumb have four muscles inserted, the

Extensor Primi Internodii Pollicis,
Abductor Pollicis,
Adductor Pollicis,
Flexor Brevis Pollicis.

The second Phalanx of the thumb has two muscles inserted, the

Extensor Secundi Internodii Pollicis,
Flexor Longus Pollicis.

The first Phalanges of the four fingers have three muscles inserted, the

Interossei,
Lumbricales,
Extensor Digitorum Communis.

In addition to these three muscles, the first Phalanx of the indicator and the little finger has each two other inserted into it.

Inserted into the Indicator,

Extensor Indicis, (also into the second and third Phalanges),
Abductor Indicis.

Inserted into the little finger,

Flexor Brevis Minimi Digiti,
Abductor Minimi Digiti.

The second Phalanges of the four fingers have two muscles inserted, the

Flexor Digitorum Sublimis,
Extensor Digitorum Communis.

The third Phalanges of the four fingers have two muscles inserted, the

Flexor Digitorum Profundus,
Extensor Digitorum Communis.

INFERIOR EXTREMITY.

The Femur has twenty muscles attached to it; of which seven arise, thirteen are inserted.

Arise the

Vasti, Externus et Internus,
Cruræus,
Biceps Flexor Crusis, (short head.)
Gastrocnemius,
Plantaris,
Poplitæus :

Inserted the

Glutæi, Maximus, Medius, et Minimus,
Pyriformis,
Gemelli, Superior et Inferior,
Obturatores, Externus et Internus,
Quadratus Femoris,
Iliacus Internus,
Psoas Magnus,
Pectinæus,
Triceps Adductor Femoris,

The Glutæus Maximus is attached below the great trochanter and to the upper part of the outer lip of the linea aspera; the Glutæi, Medius et Minimus, to the trochanter major; the Psoas Magnus and Iliacus Internus to the trochanter minor; the Pectinæus to the line below it; the Pyriformis, Gemelli, and Obturatores to the fossa of the great trochanter; the Quadratus Femoris to the lower part of the great trochanter and to the inter-trochanteric line; the Triceps to the whole inner lip of the linea aspera; the short head of the Biceps to the lower part of the outer lip of the linea aspera; the Cruræus to the fore part of the shaft of the bone; the two Vasti to the sides of the shaft and lips of the linea aspera; the Gastrocnemius to the posterior surface above the condyles; the Plantaris and Poplitæus to the back of the external condyle.

The PATELLA has four muscles inserted into it, the
Rectus,
Cruræus,
Vasti, Externus et Internus.

The TIBIA has fifteen muscles attached; of which six arise, nine are inserted.

Arise the

Tibialis Anticus,
Extensor Longus Digitorum,
Peronæus Longus,
Solæus,
Flexor Longus Digitorum,
Tibialis Posticus:

Inserted the

Rectus,
Cruræus,
Vastus Externus,
Vastus Internus, } by the ligament patellæ,
Sartorius,
Gracilis,
Semi Tendinosus,
Semi Membranosus,
Poplitæus.

The Ligamentum Patellæ is attached to the tubercle of the tibia; the Sartorius, Gracilis, Semi-membranosus, and Semi-tendinosus, to the inner surface below the head; the Peronæus Longus and Extensor Longus Digitorum to the outer surface below the head; the Tibialis Anticus to the two upper thirds of the outer surface; the Poplitæus to the upper fifth of the posterior surface; the Solæus, Tibialis Posticus, and Flexor Longus Digitorum, to the inferior four-fifths of the posterior surface.

The FIBULA has nine muscles attached to it; of which eight arise, one is inserted.

Arise the

Extensor Longus Digitorum,
Extensor Proprius Pollicis,
Perinæi, *Longus,* Brevis, et Tertius,
Solæus,
Tibialis Posticus,
Flexor Longus Pollicis:

Inserted the

Biceps.

The Biceps is attached to the head of the fibula; the Perinæi, Longus et Brevis, to the outer surface; the Extensor. Longus Digitorum, Perinæus Tertius, and Extensor Proprius Pollicis, to the inner surface; the Solæus, Tibialis Posticus, and Flexor Longus Pollicis to the posterior surface.

The ASTRAGLAUS. No muscles are attached to this bone.

The CALCIS has ten muscles attached; of which seven arise, three are inserted.

Arise the

Extensor Brevis Digitorum,
Flexor Brevis Digitorum,
Abductor Minimi Digiti,
Musculus Accessorius,
Abductor Pollicis,
Flexor Brevis Pollicis,
Adductor Pollicis:

Inserted the

Gastrocnemius,
Solæus,
Plantaris.

The Extensor Brevis Digitorum is attached to the upper and anterior part of the calcis; the Gastrocnemius and Solæus by the tendo achillis, and the Plantaris to the under and posterior surface; the Abductor

Pollicis, Flexor Brevis Digitorum, and Musculus Accessorius, to the under and inner surface; the Abductor Minimi to the outer surface; the Flexor Brevis and Adductor Pollicis to the anterior part.

The Scaphoid Bone has one muscle partly inserted into it, the

Tibialis Posticus.

The Cuboid Bone has three muscles attached to it; of which two arise, one is inserted.

Arise the
Adductor Pollicis,
Flexor Minimi Digiti:
Inserted the
Tibialis Posticus.

The Internal Cuneiform Bone has three muscles partly inserted into it, the

Tibialis Anticus,
Tibialis Posticus,
Peronæus Longus.

The Middle Cuneiform Bone has partly inserted into it the

Tibialis Posticus.

The External Cuneiform Bone has three muscles attached to it; of which two arise, one is inserted.

Arise the
Flexor Brevis Pollicis,
Adductor Pollicis:
Inserted the
Tibialis Posticus.

The Five Metatarsal Bones have attached to them two muscles, the

Transversalis Pedis,
Interossei.

The first Metatarsal Bone has in addition to the common muscles, two others partly inserted into it, the

Tibialis Anticus,
Perinæus Longus.

The second Metatarsal Bone has two muscles partly attached to it; of which one arises, the other is inserted.

Arises the
Adductor Pollicis:
Inserted the
Peronæus Longus.

The third Metatarsal Bone has partly arising from it, the

Adductor Pollicis.

The fifth Metatarsal Bone has four muscles attached to it; of which two arise, and two are inserted.

Arise the
Abductor Minimi Digiti,
Flexor Minimi Digiti:

Inserted the
Peronæus Brevis,
Peronæus Tertius.

The first Phalanx and Sesamoid Bones of the great toe have five muscles inserted, the

Extensor Brevis Digitorum,
Extensor Proprius Pollicis,
Flexor Brevis Pollicis,
Abductor Pollicis,
Adductor Pollicis.

The second Phalanx of the great toe has two muscles inserted, the

Extensor Proprius Pollicis,
Flexor Longus Pollicis.

The first Phalanges of the second, third, and fourth toes, have four muscles inserted, the

Extensor Longus Digitorum,
Extensor Brevis Digitorum,
Interossei,
Lumbricales.

The first Phalanx of the little toe has five muscles inserted, the

Extensor Longus Digitorum,
Interosseus, (Adductor Minimi Digiti),
Lumbricalis,
Flexor Minimi Digiti,
Abductor Minimi Digiti.

The second Phalanges of the second, third, and fourth toes, have three muscles inserted, the

Extensor Longus Digitorum,
Extensor Brevis Digitorum,
Flexor Brevis Digitorum.

The third Phalanges of the second, third, and fourth toes, have three muscles inserted, the

Extensor Longus Digitorum,
Extensor Brevis Digitorum,
Flexor Longus Digitorum.

The second and third Phalanges of the little toe have not any short extensor tendon; in other respects the attachment of muscles is similar to that of the other toes.

LIGAMENTS.

The extent and direction of motion possessed by different joints is very various, depending upon three causes:—1st. Upon the form of the articulatory surfaces of the bones entering into the joint. 2nd. Upon the form and position of the ligaments by which these are held together. 3rd. Upon the number, force, and direction of the muscles which move them.

All joints may be classed under three genera.

1. Synarthrodial, or immoveable.
2. Diarthrodial, or moveable.
3. Amphiarthrodial, or those intermediate between the other two genera.

1. SYNARTHROSIS.

This form of articulation is only found between flat bones, where the two neighbouring bones are articulated by an intervening cartilaginous plate, (sometimes very small) which is strengthened by the continuation of the periosteum over it.

This genus of articulation includes three species :—

1. Sutura, by which the bones of the cranium and face are united; it contains three varieties.
    1. *The Serrated Suture,* where the serrated edge of one bone is received into that of another ; as in the sagittal, coronal, and lambdoidal suture.
    2. *The Squamous,* where the edge of one bone overlaps that of another ; as the squamous portions of the temporal and the parietal bones.
    3. *Harmonia,* where the serrations are very slight, the edges of the bones being nearly flat; as in the tranverse suture of the face.
2. Schindylesis, or Furrowing, where the edge of one bone is received into a groove in another; as the median spine of the sphenoid into the vomer.
3. Gomphosis, where a portion of one bone is inserted into a cavity in another ; as the teeth into the alveolar processes.

2. DIARTHROSIS.

It is in this kind of articulation that the most perfect form of joint is seen, where not only ligament and cartilage, but synovial membrane also, are necessary. The bones themselves are not in contact but are held together by these tissues.

This genus contains four species:—

1. **Enarthrosis**, or the ball and socket joint.
2. **Ginglimus**, or the hinge joint, in which the chief motion is limited to extension and flexion
3. **Trochoides**, or the pulley form of joint, where one bone rotates upon another; as the radius upon the ulna.
4. **Arthrodia**, in which the plane, or almost plane, surfaces of bones are opposed to each other; in this form of joint but little motion is allowed; as is seen in the transverse processes of the vertebræ, and the carpal and tarsal articulations.

3. AMPHIARTHROSIS.

This genus of articulation is intermediate between the other two, the union between the bones being accomplished by the interposition of a thick plate of cartilage or fibro cartilage, assisted by ligaments which pass from one bone to another. It is seen in the articulations of the bodies of the vertebræ with each other, and the ossa ilia with the sacrum. It has no subdivision.

LIGAMENTS OF PARTICULAR JOINTS.

TEMPORO-MAXILLARY ARTICULATION.

The articulation of the lower jaw is the only one of the head and face which does not belong to the synarthrodial form.

The condyloid process of the lower jaw is articulated with the glenoid cavity by means of an inter-articular cartilage, two synovial sacs, and three ligaments.

The Internal Lateral Ligament,
The External Lateral Ligament,
The Stylo Maxillary Ligament.

ARTICULATION OF THE VERTEBRÆ.

The numerous ligaments of the vertebral column are divided into those which are common to all the vertebræ, and those which belong to particular bones.

Those which are common to the whole.

The vertebræ are connected by their bodies, and arches; tranverse, oblique, and spinous processes.

1. *The Common Anterior Vertebral Ligament,* extends from the first cervical vertebra to the sacrum, on the anterior surface of the column.

2. *The Crucial Ligaments* are short decussating fibres which pass from one vertebra to another, beneath the anterior ligament.

3. *The Common Posterior Ligament* extends from the second cervical vertebra to the sacrum, on the posterior surface of the column.

4. *The Inter-vertebral Substance* connects the bodies of the two adjoining vertebræ, from the second to the sacrum.

5. *The Ligamenta Subflava* form a series of elastic ligaments, connecting the arches of adjoining vertebræ, from the second to the sacrum.

6. *The Articular, or Oblique Processes,* are connected together by imperfect *capsular* ligaments and synovial membranes.

7. *The Inter-transverse Ligaments* extend between the transverse processes.

8. *The Inter-spinous Ligaments* extend between the spinous processes.

9. *The Ligamentum Nuchæ, or Cervical Ligament,* extends from the spine of the occipital bone, to the spines of the five superior cervical vertebræ.

Ligaments proper to particular bones.

Articulation of the Occiput with the Atlas and Axis.

The occipital bone is united to the first vertebra by two synovial membranes and four ligaments.

1. *and* 2. *The two Capsular.*

3. *The Anterior Portion of the Circular Ligament.*

4. *The Posterior Portion of the Circular Ligament.*

The occipital bone, though not in contact with, is connected to, the second vertebra by three ligaments.

1. *The Perpendicular,* which is properly a continuation of the common posterior ligament; it extends from the odontoid process, or rather from the transverse ligament, to the anterior margin of the foramen magnum.

2. and 3. *The Alar or Moderator Ligaments,* which extend from the odontoid process to the sides of the foramen magnum.

The atlas and dentata are connected to each other by the capsular ligaments common to the other vertebræ, and also by the odontoid process, which is attached to the atlas by two synovial sacs and the *Transverse Ligament.*[*]

ARTICULATIONS OF THE RIBS.

The head of each rib is connected to the bodies of the two adjoining vertebræ, and the intervening fibro-cartilage by two complete synovial sacs and two ligaments, except the first, eleventh, and twelfth ribs, which only articulate with one vertebra each, and where consequently there is only one synovial sac and no inter-articular ligament.

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[*] The anterior and posterior ligaments, which connect the bodies of the Atlas and Axis, are by some described as the anterior and posterior atlo-axoid ligaments; they are, however, only continuations of the common anterior and posterior ligaments.

1. *The Anterior Ligament* surrounds the anterior surface of the head of the rib, and divides into three fasciculi, to be attached to the two vertebræ and to the connecting inter-vertebral substance.

2. *The Inter-articular Ligament* attaches the eminence between the two articular surfaces on the head of the rib to the inter-vertebral substance.

The tubercle of each rib, except the eleventh and twelfth, is articulated with the transverse process of the inferior of the two vertebræ, to the bodies of which its head is united. In this articulation there is one synovial membrane and three ligaments.

1. and 2. *The Posterior and Internal Costo-transverse Ligaments,* which extend from the transverse process, to the neck of the rib.

3. *The External Oblique Ligament,* which extends from the neck of the rib below, to the transverse and oblique processes immediately above.

The anterior extremity of each rib is united with its corresponding cartilage by fibres which pass on both surfaces; each of the seven superior ribs is also connected with the sternum by a small synovial membrane, and *Anterior and Posterior Ligaments.*

The Ligamentum Arcuatum is a ligamentous band, which proceeds from the transverse processes of the first and second lumbar vertebræ to the inferior edge of the first rib; by some anatomists this is called the false ligamentum arcuatum, and the term true, given to some ligamentous fibres which extend from the transverse process of the first, to the body of the second lumbar vertebra.

STERNAL ARTICULATIONS.

The anterior and posterior ligaments which connect the ribs with the sternum, form a fibrous envelope for it; but in addition to these, the three bones of which in the adult it is composed, are connected together by two series of longitudinal fibres called from their situation the—

1. *Proper Posterior Ligament of the Sternum.*
2. *Proper Anterior Ligament of the Sternum.*

STERNO-CLAVICULAR ARTICULATION.

This articulation is formed by the inner extremity of the clavicle and the first bone of the sternum; in this joint there is an inter-articular cartilage, two synovial sacs, and four ligaments.

1. and 2. *The Anterior and Posterior Ligaments,* run from the clavicle to the sternum, the one on the

anterior, the other on the posterior surface of the joint.

3. *The Inter-clavicular Ligament* is a strong band of fibres, which passes from one clavicle to the other, immediately above the upper edge of the sternum, with which it is connected.

4. *The Costo-clavicular, or Rhomboid Ligament,* extends from the small tubercle, on the under surface of the sternal end of the clavicle, to the cartilage of the first rib.

SCAPULO-CLAVICULAR ARTICULATION.

The external end of the clavicle forms with the acromion process of the scapula an arthrodial articulation, which is maintained by a synovial sac and two ligaments; it is also connected to, but not in contact with, the coracoid process by two ligaments.

1. and 2. *Superior and Inferior Ligaments* pass between the clavicle and acromion process.

3. and 4. *The Conoid and Trapezoid Ligaments:* —the two have a single attachment to the coracoid process, but are separately inserted into the clavicle; the conoid is the internal, the trapezoid the external and anterior.

LIGAMENTS PROPER TO THE SCAPULA.

These ligaments are two; the one which passes between the coracoid and acromion processes, is broad where it is connected to the coracoid, and narrow where it is connected with the point of the acromion process. The other converts the posterior notch of the scapula into a foramen: they are—

1. *The Anterior, Deltoid, or Coraco-acromial Ligament.*

2. *The Posterior, or Coracoid Ligament.*

HUMERO-SCAPULAR ARTICULATION.

The shoulder joint forms a very perfect enarthrodial articulation, in which the head of the humerus is received into the glenoid cavity of the scapula; this cavity is deepened by a rim of fibro-cartilage,—the *glenoid ligament,* which is partly derived from the biceps tendon. In this joint there is a synovial sac and two ligaments.

1. *The Capsular Ligament* encircles the joint, being attached to the necks of the scapula and humerus.

2. *The Accessory, or Coraco-humeral,* extends from the coracoid process to the greater tuberosity of the humerus, where it is confounded with the capsular ligament: it scarcely deserves to be considered as distinct from the capsular.

HUMERO-CUBITAL ARTICULATION.

The elbow joint is a perfect example of the hinge articulation, it is formed by the expanded convex condyles of the humerus being received into the heads of the ulna and radius ; the connection is maintained by a synovial sac and four ligaments.

1. *The Anterior Ligament* extends from the lower part of the humerus, to the coronary ligament of the radius and coronoid process of the ulna.

2. *The Posterior Ligament* is not so distinct as the anterior, it extends from one condyle to the other, behind the olecranon process.

3. *The External Lateral Ligament* extends from the external condyle to the coronary ligament of the radius.

4. *The Internal Lateral Ligament* extends from the internal condyle, to the olecranon and coronoid processes of the ulna.

RADIO-ULNAR ARTICULATIONS.

The radius and ulna are connected throughout their extent by ligament. Two joints of the trochoidal kind are formed; these are distinguished as the superior and inferior radio-ulnar articulations.

The superior properly forms a part of the elbow joint, since the head of the radius enters into the composition of it, and the synovial sac is common to both. The head of the radius is received into the smaller sigmoid cavity of the ulna. There is only one ligament,

The Coronary, which is attached to the anterior and posterior edges of the lesser sigmoid cavity of the ulna, it passes close round the neck of the radius, but is not connected to it.

The opposed edges of the radius and ulna are connected by two ligaments, which are sometimes called the middle radio-ulnar articulation.

1. *The Oblique Ligament* extends in a cord-like form, downwards and *outwards,* from the coronoid process of the ulna to the tubercle of the radius.

2. *The Interosseal Ligament* consists of a broad expanded series of fasciculi, which pass obliquely *inwards,* from the radius to the ulna throughout the greater part of their extent.

In the inferior radio-ulnar articulation the ulna is received in a concave surface of the radius. The bones are retained in situ by the inter-articular cartilage, which extends from the inner edge of the radius to the styloid process of the ulna and separates this bone from the carpus, by a synovial sac which is called the *sacciform ligament,* and by a series of anterior and posterior transverse fibres which pass from one bone to the other.

RADIO-CARPAL ARTICULATION.

In this articulation the under end of the radius and inter-articular cartilage form a shallow cavity, which receives the scaphoid, lunar, and cuneiform bones. The synovial sac is large, and as it passes over the three small bones dips in between them. There are four ligaments.

1. *The Anterior Ligament* extends from the lower end of the radius to the first row of carpal bones.

2. *The Posterior Ligament* extends from the radius to the lunar and cuneiform bones.

3. *The Internal Lateral Ligament* extends from the styloid process of the ulna to the cuneiform bone.

4. *The External Lateral Ligament* extends from the styloid process of the radius to the scaphoides and trapezium.

At the wrist two ligaments are found, which tie down the flexor tendons on the anterior surface; and the extensor tendons on the posterior surface; they are the

Ligamentum Carpi Annulare Anterior, which extends from the pisiform and the projecting hook-like portion of the unciform, across the wrist, to the scaphoides and trapezium.

Ligamentum Carpi Annulare Dorsale, which extends from the styloid process of the radius to that of the ulna.

ARTICULATION OF THE CARPAL BONES WITH EACH OTHER.

The three bones which form the first carpal row are connected together by three ligaments.

1. *The Interosseal Ligaments* are short strong fibres which pass from one bone to another.
2. *The Anterior Ligament* passes transversely across the bones, on their palmar surface.
3. *The Posterior Ligament* passes transversely across the bones, on their dorsal surface.

The pisiform bone has a distinct *capsular ligament* and synovial sac, by which it is attached to the cuneiform bone.

The four bones of the second carpal row are connected together by three ligaments in the same manner as those of the first row.

Three distinct joints are said to be formed between the first and second row of carpal bones, the trapezium and trapezoid with the scaphoid; the magnum with the scaphoid and lunar bones; and the unciform with the cuneiform bone; the first and last are arthrodial, and the second an enarthrodial, articulations. There is a synovial membrane common to the whole, and four ligaments connect them together.

1. and 2. *The Anterior and Posterior Ligaments* are short fibres which pass from one row to the other.

3. and 4. *The External and Internal Lateral Ligaments* are properly continuations of the lateral ligaments of the radio-carpal articulation.

ARTICULATION OF THE METACARPAL WITH THE CARPAL BONES, AND WITH EACH OTHER.

The first, or metacarpal bone of the thumb, is connected to the trapezium by a distinct synovial membrane and *capsular ligament.*

The other four metacarpal bones are connected to the carpus by continuations of the anterior and posterior carpal ligaments.

The four last metacarpal bones are connected at their carpal ends by small synovial sacs, and by *transverse dorsal and palmar ligaments;* at their distal extremities there are *transverse palmar and dorsal ligaments* and also *inter-transverse,* which pass from one bone to another.

ARTICULATION OF THE PHALANGES WITH THE METACARPAL BONES, AND WITH EACH OTHER.

The articulation between the head of the metacarpal bone and the first phalanx, and between each of the phalanges, is similar: into each joint there enters a synovial sac, and three ligaments which form an imperfect capsular ligament.

1. *The Anterior Ligament* is a half annular ligament, it covers the fore part and sides of the joint.

2. and 3. *The two Lateral Ligaments* extend on either side, from one bone to the other.

LIGAMENTS OF THE PELVIS.

The ligaments of the pelvis may be arranged into four sets:—1st. Those which connect the Pelvis with the Vertebræ: 2. Those which connect the Sacrum and Os Coccygis: 3. Those which unite the Sacrum with the Ossa Ilia: 4. Those which unite the Pubes.

The sacrum is connected to the last lumbar vertebra by all the ligaments which are common to the vertebral column, as the anterior and posterior, the crucial, the articular, the inter-transverse, and inter-spinous, the ligamentum subflavum, and the inter-vertebral substance; also by two other ligaments which are proper to it and the ilium, viz:—

1. *The Sacro-lumbar Ligament,* which extends from the transverse process of the last lumbar vertebra to the upper part of the sacrum.

2. *The Ilio-lumbar Ligament,* which extends between the transverse process of the last lumbar vertebra, and the superior posterior spinous process and crista of the ilium.

The coccyx is united to the sacrum by a continuation of the anterior and posterior ligaments of the vertebral column, and by a thin layer of fibro-cartilage.

The ilium on each side is firmly united to the sacrum, by a thick layer of cartilage and by four ligaments.

1. and 2. *The Anterior and Posterior Sacro-iliac Ligaments,* which extend, the one on the anterior, the other on the posterior surface, between the ilium and the two upper pieces of the sacrum.

3. *The Posterior, or great Sacro-sciatic Ligament,* extends from the posterior inferior spine of the ilium, and from the side of the sacrum and coccyx, to the inner margin of the tuber ischii; and under the name of falciform ligament, it is attached to the ascending ramus of this bone.

4. *The Anterior, or smaller Sacro-sciatic Ligament,* arises in common with the last, and is inserted into the spine of the ischium.

The symphysis pubis is formed by the thick triangular interposed plate of fibro-cartilage and two ligaments.

1. *The Anterior Ligament* is composed of transverse fibres, which pass from one pubic bone to the other.

2. *The Posterior Ligament* is in like manner composed of transverse fibres; it is the stronger of the two, and extends between the rami, below the arch of the pubis, under the name of the sub-pubic ligament.

The *Obturator, or Thyroid Ligament,* fills up the foramen of the same name.

ILIO-FEMORAL ARTICULATION.

The acetabulum is, in the recent state, considerably deepened by the cotyloid ligament passing round the margin of it. The bones are connected by a synovial membrane and three ligaments.

1. *The Capsular Ligament* is the strongest in the body, it encircles the head of the femur, passing from the circumference of the acetabulum to the base of the neck of the femur.

2. *The Accessory Ligament,* like that of the shoulder joint, scarcely deserves a distinct name; it is a strong layer of fibres which passes from the inferior anterior spine of the ilium to the fore part of the capsular ligament.

3. *The Inter-articular, or Round Ligament,* extends from the bottom of the cotyloid cavity to the fossa at the head of the femur.

FEMORO-TIBIAL ARTICULATION.

The knee joint is formed by the condyles of the femur, the upper extremity of the tibia, and the patella. It is a most complicated joint, and has more ligaments than any other in the body. In consequence of some of them being partially enveloped by the synovial membrane, they are divided into the external and internal; all are however, in reality external to the synovial sac. The ligaments are sometimes enumerated as fourteen, including the synovial sac, and the two semilunar cartilages.

The External are

1. *The Ligamentum Patellæ,* which attaches the patella to the tubercle of the tibia; it is a continuation of the tendons of the four extensor muscles.

2. *The Posterior Ligament* is intimately connected with the tendon of the semi-membranous muscle; it passes from the external condyle of the femur to the inner and back part of the tibia.

3. *The Internal Lateral Ligament,* like the external, is posterior to the centre of motion; it passes from the inner condyle of the femur to the head of the

tibia, and is connected with the internal articular cartilage.

4. *The long External Lateral Ligament* passes from the external condyle to the head of the fibula.

5. *The short External Lateral Ligament* is posterior to the long, it also passes from the external condyle to the head of the fibula.

The Internal Ligaments of the knee joint are,

6. *The Anterior Crucial Ligament,* which extends from the back part of the external condyle to the depression anterior to the spine of the tibia.

7. *The Posterior Crucial Ligament* passes from the internal condyle of the femur to the tibia posterior to the spine.

8. and 9. *The Alar Ligaments* are merely folds of the synovial membrane, where it is reflected from the tibia upon the edges of the ligamentum patellæ.

10. *The Mucous Ligament* is also a fold of the synovial membrane, where it is reflected from the tibia to the depression between the condyles of the femur.

11. *The Transverse Ligament* connects the anterior cornua of the two semilunar cartilages; of these two bodies, the inner is the longer from before to behind, and embraces the external, which is more circular than the inner, they are held in situ by their attachment to the tibia near its spine, and to the lateral ligaments.

FIBULO-TIBIAL ARTICULATIONS.

The tibia and fibula are united firmly together superiorly and inferiorly, in each situation by a synovial membrane and two ligaments, in the intervening space by the inter-osseous ligament.

Upper Articulation.

The Anterior and Posterior Ligaments are similar, the one passes on the anterior, the other on the posterior surface, from the tibia to the fibula.

The Inter-osseous Ligament consists of a series of fibres which pass between the tibia and fibula throughout the greater part of their course, it is sometimes called the Middle Articulation.

Lower Articulation.

The Anterior and Posterior Ligaments are each of a triangular form, and pass from the outer malleolus to the tibia.

ARTICULATION OF THE ANKLE JOINT.

In this articulation the head of the astragalus is received into the cavity formed by the tibia and fibula; there is a synovial sac and five ligaments.

1. *The Anterior Ligament* passes from the fore part of the tibia to the anterior surface of the astragalus.

2. *The Internal Lateral, or Deltoid Ligament,* is

of a triangular form, it extends from the internal malleolus to the inner side of the astragalus and calcis.

3. 4. and 5. There are three *External Lateral Ligaments,* all of which pass from the outer malleolus; the *middle* descends vertically to the upper part of the calcis; the *anterior* passes to the side and fore part of the astragalus; the *posterior* passes backwards to the ridge on the back of the astragalus.

ARTICULATION OF THE TARSAL BONES WITH EACH OTHER.

The astragalus is connected to the calcis by two articulatory surfaces, each of which has a synovial sac; there are three ligaments.

1. *The Inter-osseous Ligament* is attached to the fossæ of these bones, between their articulating surfaces.

2. *The Posterior Ligament* is attached to the adjoining surfaces of the two bones.

3. *The External Ligament* passes from the outer surface of the astragalus to the calcis, under the middle external lateral ligament of the ankle joint.

The astragalus is connected to the navicular bone by a synovial membrane, and a *superior broad ligament,* which covers the upper surfaces of the two bones.

The calcis and navicular bones, though not in contact, are connected by two ligaments;

1. *The External Ligament,* which passes between the outer surfaces of these bones.

2. *The Calcaneo-navicular, or Sub-astragalar Ligament,* extends from the smaller tuberosity of the calcis to the inferior surface of the navicular bone, and supports the astragalus.

The calcis and cuboid bones form an arthrodial articulation, which is strengthened by a synovial sac and two ligaments.

1. *The Superior Ligament* passes from the upper surface of one bone to that of the other.

2. *The Inferior Ligament* is very strong, and consists of a deep and superficial layer; it extends from near the tuberosity of the calcis to the inferior surface of the cuboid bone, and also to the fourth and fifth metatarsal bones.

The navicular and cuboid bones are connected by *dorsal and plantar transverse fibres.*

A dorsal and a plantar band of fibres connect the cuboid and external cuneiform bones together.

The three cuneiform bones are connected to the navicular by a common synovial membrane, and by *dorsal and plantar ligamentous fibres:*—they are also connected to each other by *transverse dorsal and plantar ligaments.*

ARTICULATION OF THE METATARSAL BONES AND PHALANGES.

The three inner metatarsal bones are articulated with the cuneiform bones, and the two outer with the cuboid; *dorsal and plantar bands* of fibres, corresponding to each metatarsal bone, connect them with the tarsal bones.

The bases of the four outer metatarsal bones are connected to each other by synovial sacs, *inter-osseous, dorsal, and plantar transverse ligaments.* The distal ends of all the five metatarsal bones are connected together by *transverse ligamentous bands.*

The articulations of the metatarsal bones with the phalanges, and these with each other, as in the hand, are formed by *an anterior and two lateral ligaments.*

MUSCULAR SYSTEM.

In giving the origin of muscles, those are arranged together which, from their contiguous positions, are generally dissected at the same time; subsequently follow tables of the muscles, classed according to the parts they act upon.

SUPERFICIAL MUSCLES OF THE HEAD,—THREE PAIRS AND ONE SINGLE.

There is only one muscle of the scalp, but immediately below it are the three common small muscles of the ear.

1. Occipito Frontalis (single),
2. Attollens Aurem,
3. Attrahens Aurem,
4. Retrahens Aurem.

The Occipito Frontalis *arises* from the posterior part of each mastoid process, and from the external portions of the superior transverse ridge of the occipital bone; it is *inserted* into the integuments of each eye-brow, where its fibres mix with those of the corrugator supercilii and orbicularis palpebrarum.

The Attollens Aurem *arises* from the temporal aponeurosis; it is *inserted* into the upper and anterior part of the cartilage of the ear.

The Attrahens Aurem *arises* from the temporal aponeurosis and from the zygomatic process; it is *inserted* into the fore part of the helix.

The Retrahens Aurem *arises* from the mastoid process of the temporal bone; it is *inserted* into the back part of the concha.

*MUSCLES OF THE FACE,—THIRTEEN PAIRS AND ONE SINGLE.

1. Orbicularis Palpebrarum,
2. Corrugator Supercilii,
3. Pyramidalis Nasi,
4. Compressor Nasi,
5. Levator Labii Superioris Alæque Nasi,
6. Zygomaticus Minor,
7. Zygomaticus Major,
8. Levator Anguli Oris,
9. Depressor Labii Superioris Alæque Nasi,
10. Depressor Anguli Oris,
11. Depressor Labii Inferioris,
12. Levator Labii Inferioris,
13. Buccinator,
14. Orbicularis Oris, (single).

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* Many authors speak of another muscle under the name of Tensor Tarsi, which is said to arise from the lachrymal bone and to be inserted into the lachrymal ducts.

The Orbicularis Palpebrarum *arises* from the internal angular process of the frontal bone, and from the superior edge of the tarsal tendon; it is *inserted* into the inferior edge of this tendon, and into the nasal process of the superior maxillary bone.

The Corrugator Supercilii *arises* from the internal angular process of the frontal bone; it is *inserted* into the integuments of the eye-brow.

The Pyramidalis Nasi *arises* (when present) from the occipito-frontalis; it is *inserted* into the fibres of the compressor nasi. This small muscle is formed by a few of the fibres of the occipito-frontalis being continued down the nasal bone.

The Compressor Nasi *arises* from the canine fossa of the superior maxillary bone; it is *inserted* into the dorsum of the nose by a thin aponeurosis common to the two muscles.

The Levator Labii Superioris Alæque Nasi *arises* by a double origin: 1st, from the edge of the orbit above the infra-orbital foramen; 2nd, from the nasal process of the superior maxillary bone; it is *inserted* into the cartilage of the nose and into the upper lip.

The Zygomaticus Minor (often wanting) *arises* from the upper part of the malar bone; it is *inserted* into the upper lip near the commissure.

The Zygomaticus Major *arises* from the zygomatic process of the malar bone; it is *inserted* into the commissure of the lips.

The Levator Anguli Oris *arises* from the canine fossa immediately below the infra-orbital foramen; it is *inserted* into the commissure of the lips.

The DEPRESSOR LABII SUPERIORIS ALÆQUE NASI *arises* from the alveolar process of the upper jaw, above the canine and incisor teeth; it is *inserted* into the upper lip and into the cartilage of the nose.

The DEPRESSOR ANGULI ORIS *arises* from the oblique line on the outer side of the lower jaw, between the masseter muscle and the mental foramen; it is *inserted* into the commissure of the lips.

The DEPRESSOR LABII INFERIORIS *arises* from the fore part of the inferior maxillary bone; it is *inserted* into the under lip.

The LEVATOR LABII INFERIORIS *arises* from the alveolar process of the inferior maxillary bone near the symphysis; it is *inserted* into the integuments of the chin.

The BUCCINATOR *arises* from the alveoli of the molar teeth, both of the inferior and superior jàws, and also from the pterygo-maxillary ligament; (this ligament is a band of fibres which extends between the internal pterygoid process and the coronoid process); it is *inserted* into the commissure of the lips.

The ORBICULARIS ORIS consists of two fasciculi of fibres, one for each lip, which surround the opening of the mouth; they are completely blended with, and partly derived from, the other muscles which terminate in the lips.

MUSCLES UPON THE SIDE OF THE FACE,—FOUR PAIRS.

1. Masseter,
2. Temporalis,
3. Pterygoideus Internus,
4. Pterygoideus Externus.

The **Masseter** consists of superficial and deep portions; the superficial *arises* from the malar bone and the tuberosity of the upper maxilla; the fibres pass obliquely backwards to be *inserted* into the outer surface of the angle of the jaw. The deep portion *arises* from the zygomatic arch, as far back as the glenoid cavity; the fibres pass obliquely forwards to be *inserted* into the outer surface of the ramus of the jaw.

The **Temporalis** *arises* from the temporal aponeurosis, and the temporal fossa; (this extends from the external angular process of the frontal bone to the mastoid process of the temporal bone, and from the semicircular ridge upon the parietal to the crest at the root of the greater wing of the sphenoid bone;) it is *inserted* into the coronoid process of the lower jaw.

The **Pterygoideus Internus** fills the pterygoid fossa, it *arises* from the inner surface of the external pterygoid process, and from the pterygoid process of the palate bone; it is *inserted* into the inner surface of the angle of the lower jaw.

The Pterygoideus Externus *arises* from the crest on the greater wing of the sphenoid bone, from the external pterygoid plate, from the outer surface of the pterygoid process of the palate bone, and from the tuberosity of the superior maxillary bone; it is *inserted* into the inter-articular cartilage, and into the neck of the lower jaw.

MUSCLES OF THE ORBIT,—SEVEN; OF THESE SIX BELONG TO THE EYE-BALL, ONE TO THE UPPER EYE-LID.

1. Levator Palpebræ Superioris,
2. Rectus Superior, vel Attollens Oculi,
3. Rectus Inferior, vel Depressor Oculi,
4. Rectus Internus, vel Adductor Oculi,
5. Rectus Externus, vel Abductor Oculi,
6. Obliquus Superior, vel Trochlearis,
7. Obliquus Inferior.

The Levator Palpebræ Superioris *arises* from the margin of the optic foramen; it is *inserted* into the tarsal cartilage of the upper eye-lid.

The Four Recti *arise* around the optic foramen, the External also arises from the margin of the sphenoid fissure; they are all *inserted* into the sclerotic coat, about two lines behind the cornea.

The Obliquus Superior *arises* a little to the inner side of the optic foramen, it passes to the inner angular process, runs round the cartilaginous pulley, is then reflected backwards and outwards under the superior rectus, to be *inserted* into the sclerotic coat, between the superior and external recti muscles, posterior to the transverse axis of the eye-ball.

The OBLIQUUS INFERIOR *arises* from the orbital edge of the superior maxillary bone, external to the lachrymal sac, it passes outwards and backwards under the inferior rectus, to be *inserted* into the sclerotica, where it is covered by the external rectus, posterior to the transverse axis of the eye-ball.

MUSCLES OF THE NECK,—FIFTEEN PAIRS.

1. Platysma Myoides,
2. Sterno Cleido Mastoideus,
3. Sterno Hyoideus,
4. Sterno Thyroideus,
5. Thyro Hyoideus,
6. Omo Hyoideus,
7. Digastricus,
8. Mylo Hyoideus,
9. Genio Hyoideus,
10. Hyo Glossus,
11. Genio Hyo Glossus,
12. Lingualis,
13. Stylo Hyoideus,
14. Stylo Glossus,
15. Stylo Pharyngeus.

The PLATYSMA MYOIDES *arises* from the cellular membrane covering the upper part of the deltoid and greater pectoral muscles, near to the clavicle; it is *inserted* into the integuments of the jaw and chin, many of its fibres become mingled with the muscles on the side of the face, and some pass to the fascia over the parotid gland.

The STERNO CLEIDO MASTOIDEUS *arises* from the upper part of the sternum and from the inner third of the clavicle; it is *inserted* into the mastoid process of the temporal, and into the outer third of the superior transverse ridge of the occipital bones.

The STERNO HYOIDEUS *arises* from the inner surface of the first bone of the sternum, from the cartilage of the first rib, and from the inner extremity of the clavicle; it is *inserted* into the lower edge of the body of the os hyoides.

The STERNO THYROIDEUS *arises* from the inner surface of the first bone of the sternum and from the cartilage of the second rib; it is *inserted* into the oblique line on the thyroid cartilage.

The THYRO HYOIDEUS is a continuation of the sterno-thyroideus; it *arises* from the oblique line on the thyroid cartilage, and is *inserted* into the lower edge of the cornu of the os hyoides.

The OMO HYOIDEUS *arises* from the superior border of the scapula, near the semilunar notch; it is *inserted* into the point of junction of the body and cornu of the os hyoides.

The DIGASTRICUS *arises* from the digastric groove behind the mastoid process of the temporal bone, perforates the stylo-hyoideus, with which it is connected to the cornu of the os hyoides, and is then reflected upwards; to be *inserted* into the inner side of the base of the lower jaw, close to the symphysis.

The Mylo Hyoideus *arises* from the mylo-hyoid ridge on the inferior maxilla, extending from the last molar tooth to the symphysis; it is *inserted* into the body of the os hyoides, and into the median aponeurotic line (formed by the union of the opposite muscles) which extends from the symphysis menti to the os hyoides.

The Genio Hyoideus *arises* from the inferior tubercle on the inner side of the symphysis, above the insertion of the digastricus; it is *inserted* into the body of the os hyoides.

The Hyo Glossus *arises* from the greater cornu and part of the body of the os hyoides; it is *inserted* into the side of the tongue, forming part of its substance.

The Genio Hyo Glossus *arises* from the symphysis menti under the frenum linguæ; it is *inserted* into the median line of the tongue, from the tip to the base, and into the os hyoides.

The Lingualis consists of a series of muscular fibres which run along the whole length of the tongue, forming part of its substance; they are placed between the genio-hyo-glossus and the hyo-glossus.

The Stylo Hyoideus *arises* from the outer side of the base of the styloid process; it is *inserted* into the greater cornu and body of the os hyoides.

The Stylo Glossus *arises* from the apex of the styloid process, and from the stylo-maxillary ligament; it is *inserted* along the side of the tongue.

The Stylo Pharyngeus *arises* from the base of the styloid process; it is *inserted* into the thyroid cartilage, and into the side of the pharynx with the middle constrictor.

MUSCLES OF THE PALATE AND PHARYNX,—EIGHT PAIRS.

1. Levator Palati,
2. Tensor vel Circumflexus Palati,
3. Motor vel Azygos Uvulæ,
4. Palato Glossus,
5. Palato Pharyngeus,
6. Constrictor Pharyngis Inferior,
7. Constrictor Pharyngis Medius,
8. Constrictor Pharyngis Superior.

The Levator Palati *arises* from the petrous bone, in front of the carotid foramen; it is *inserted* into the velum palati.

The Tensor Palati *arises* from the spine of the sphenoid bone, from the fossa navicularis, and from the eustachian tube; it winds round the hamular process: by expanding, it forms with the opposite muscle the aponeurotic fibres of the velum palati, which are *attached* to the posterior edge of the palate bone.

The MOTOR UVULÆ *arises* from the spine of the palate bone; it is *inserted* into the cellular membrane of the uvula.

The PALATO GLOSSUS *arises* from the inferior surface of the velum palati; it forms the anterior pillar of the fauces, and is *inserted* into the base of the tongue.

The PALATO PHARYNGEUS *arises* broad from the soft palate; it forms the posterior pillar of the fauces, and is *inserted* into the pharynx and cornu of the superior thyroid cartilage.

The CONSTRICTOR PHARYNGIS INFERIOR *arises* from the cricoid, and from the inferior cornu and ala of the thyroid cartilages; it is *inserted* into the back of the pharynx with the opposite muscle.

The CONSTRICTOR PHARYNGIS MEDIUS *arises* from the cornu and appendix of the os hyoides, and from the stylo-hyoid and thyro-hyoid ligaments; it is *inserted,* with the opposite muscle, into the posterior median line of the pharynx, and also into the basilar process of the occipital bone.

The CONSTRICTOR PHARYNGIS SUPERIOR *arises* from the lower part of the internal pterygoid process, from the pterygo-maxillary ligament, from the posterior portion of the mylo-hyoid ridge, and from the side of the base of the tongue; it is *inserted,* with the opposite muscle, into the posterior median raphe of the pharynx, and into the basilar process of the occipital bone.

MUSCLES OF THE LARYNX,—FOUR PAIRS, AND ONE SINGLE.

1. Crico Thyroideus,
2. Crico Arytenoideus Lateralis,
3. Crico Arytenoideus Posticus,
4. Thyro Aryteniodeus,
5. Arytenoideus, (single.)

The Crico Thyroideus *arises* from the cricoid cartilage; it is *inserted* into the lower margin of the thyroid.

The Crico Arytenoideus Lateralis *arises* from the upper border of the cricoid cartilage; it is *inserted* into the base of the arytenoid.

The Crico Arytenoideus Posticus *arises* from the posterior surface of the broad portion of the cricoid cartilage; it is *inserted* into the outer side of the base of the arytenoid cartilage.

The Thyro Arytenoideus *arises* from the angle between the two alæ of the thyroid cartilage; it is *inserted* into the anterior border of the arytenoid cartilage.

The Arytenoideus fills up the posterior concave surface of the two arytenoid cartilages, some of the fibres pass transversely, others pass obliquely from the base of one cartilage to the apex of the other; from this circumstance this muscle is sometimes divided into three, the transverse and two oblique.

MUSCLES PLACED DEEPLY IN THE NECK,—SEVEN PAIRS.

1. Longus Colli,
2. Rectus Capitis Anticus Major,
3. Rectus Capitis Anticus Minor,
4. Rectus Capitis Lateralis,
5. Scalenus Anticus,
6. Scalenus Medius,
7. Scalenus Posticus.

The Longus Colli *arises* from the anterior surface of the bodies of the three upper dorsal vertebræ, from the head of the first rib, from the bodies and anterior tubercles of the transverse processes of the four inferior cervical vertebræ, and from the intervertebral substances; it is *inserted* into the bodies of the three superior cervical vertebræ.

The Rectus Capitis Anticus Major *arises* from the anterior tubercles of the third, fourth, fifth, and sixth cervical vertebræ; it is *inserted* into the cuneiform process of the occipital bone.

The Rectus Capitis Anticus Minor *arises* from the body and transverse process of the atlas; it is *inserted* into the cuneiform process of the occipital bone.

The Rectus Capitis Lateralis *arises* from the transverse process of the atlas; it is *inserted* into the jugular process of the occipital bone.

The Scalenus Anticus *arises* from the anterior tubercles of the third, fourth, fifth, and sixth cervical vertebræ; it is *inserted* into the anterior surface of the first rib, near its cartilage.

The Scalenus Medius *arises* from the posterior tubercles of the six inferior cervical vertebræ; it is *inserted* into the upper and outer part of the first rib.

The Scalenus Posticus *arises* from the posterior tubercles of the three inferior cervical vertebræ; it is *inserted* into the second rib, on the outer side of its tubercle. This and the last may properly be regarded as one muscle.

MUSCLES OF THE BACK; THESE MAY BE ARRANGED INTO TWENTY-FIVE PAIRS.

1. Trapezius,
2. Latissimus Dorsi,
3. Rhomboideus Minor,
4. Rhomboideus Major,
5. Levator Anguli Scapulæ,
6. Serratus Posticus Superior,
7. Serratus Posticus Inferior,
8. Splenius,
9. Sacro Lumbalis,
10. Longissimus Dorsi,
11. Spinalis Dorsi,
12. Cervicalis Ascendens,
13. Transversalis Colli,

14. Trachelo Mastoideus,
15. Complexus,
16. Semi Spinalis Colli,
17. Semi Spinalis Dorsi,
18. Rectus Capitis Posticus Major,
19. Rectus Capitis Posticus Minor,
20. Obliquus Capitis Inferior,
21. Obliquus Capitis Superior,
22. Multifidus Spinæ,
23. Inter Spinales,
24. Inter Transversales,
25. Levatores Costarum.

The TRAPEZIUS *arises* from the inner third of the superior transverse occipital ridge, from the ligamentum nuchæ, from the last cervical spinous process, and from all the dorsal spines; it is *inserted* into the posterior edge of the outer third of the clavicle, into the acromion process, and into the whole of the spine of the scapula.

The LATISSIMUS DORSI *arises* from the posterior third of the crista ilii, from the spinous processes of the sacrum, from the spines of all the lumbar and six lower dorsal vertebræ, and from the anterior extremities of the three or four inferior ribs; it also frequently receives some fibres from the angle of the scapula; it is *inserted,* with the teres major, into the posterior edge of the bicipital groove of the humerus.

The RHOMBOIDEUS MINOR *arises* from the last cervical spine, and lower part of the ligamentum nuchæ; it is *inserted* into the base of the scapula, above and opposite to the spine.

The RHOMBOIDEUS MAJOR *arises* from the spinous processes of the four or five upper dorsal vertebræ; it is *inserted* into the base of the scapula, from the spine to the inferior angle.

The LEVATOR ANGULI SCAPULÆ *arises* from the posterior tubercles of the four or five superior cervical vertebræ; it is *inserted* into the base of the scapula, immediately below the superior angle.

The SERRATUS POSTICUS SUPERIOR *arises* from the two inferior cervical, and two or three superior dorsal spinous processes; it is *inserted* into the second, third, and fourth ribs, external to their angles.

The SERRATUS POSTICUS INFERIOR *arises* from the two inferior dorsal, and two superior lumbar spinous processes; it is *inserted* into the four inferior ribs, between their angles and cartilages.

The SPLENIUS consists of two portions, the SPLENIUS COLLI and SPLENIUS CAPITIS; the first *arises* from the spinous processes of the third, fourth, fifth, and sixth dorsal vertebræ; it is *inserted* into the posterior tubercles of the three or four superior cervical vertebræ. The splenius capitis *arises* from the spines of the two superior dorsal, and three inferior cervical vertebræ; it is *inserted* into the mastoid process of the temporal bone, and into the occipital below its superior transverse ridge.

The SACRO LUMBALIS and LONGISSIMUS DORSI form at their origin one common mass, it is only at their insertion that they can be distinguished into separate muscles; the *origin* is from the side and spinous processes of the sacrum, from the transverse and spinous processes of the lumbar vertebræ, and from the sacro-iliac ligament and posterior part of the crista ilii. The sacro-lumbalis is *inserted* into all the ribs near their angles: from the six or seven inferior ribs small muscular fasciculi *arise*, which terminate in the inner side of this muscle, (the musculi accessorii). The longissimus dorsi is *inserted* into all the ribs near the tubercles, and also into the transverse processes of all the dorsal vertebræ.

The Spinalis Dorsi *arises* from the spinous processes of the two upper lumbar, and three lower dorsal vertebræ; it is *inserted* into the spinous processes of the eight or nine superior dorsal vertebræ.

The Cervicalis Ascendens *arises* from the four or five superior ribs, between their tubercles and angles; it is *inserted* into the transverse processes of the fourth, fifth, and sixth cervical vertebræ.

The Transversalis Colli *arises* from the five superior dorsal transverse processes; it is *inserted* into the four or five inferior cervical transverse processes.

The Trachelo Mastoideus *arises* from the transverse processes of the four inferior cervical, and three or four superior dorsal vertebræ; it is *inserted* into the back part of the mastoid process of the temporal bone.

The Complexus *arises* from the articular and transverse processes of the six superior dorsal, and four inferior cervical vertebræ; it is *inserted* into the space between the two transverse ridges of the occipital bone.

The SEMI SPINALIS COLLI *arises* from the five or six superior dorsal transverse processes; it is *inserted* into the spines of the second, third, fourth, and fifth cervical vertebræ.

The SEMI SPINALIS DORSI *arises* from the transverse processes of the dorsal vertebræ, (from the sixth to the eleventh): it is *inserted* into the spinous processes of the four superior dorsal, and two inferior cervical vertebræ.

The RECTUS CAPITIS POSTICUS MAJOR *arises* from the spinous process of the axis; it is *inserted* into the inferior transverse ridge of the occipital bone.

The RECTUS CAPITIS POSTICUS MINOR *arises* from the posterior part of the atlas; it is *inserted* into the occipital bone, behind the foramen magnum.

The OBLIQUUS CAPITIS INFERIOR *arises* from the spinous process of the axis; it is *inserted* into the transverse process of the atlas.

The OBLIQUUS CAPITIS SUPERIOR *arises* from the transverse process of the atlas; it is *inserted* into the occipital bone, between its transverse ridges, immediately behind the mastoid process.

The MULTIFIDUS SPINÆ extends from the sacrum to the axis, passing obliquely between the transverse and spinous processes.

The INTER-SPINALES and INTER-TRANSVERSALES are respectively placed, as the names imply, between the spinous and transverse processes.

The Levatores Costarum *arise* from each of the dorsal transverse processes; they are *inserted* into each lower rib, between the tubercle and angle.

MUSCLES UPON THE PARIETES OF THE THORAX,—SIX PAIRS.

1. Pectoralis Major,
2. Pectoralis Minor,
3. Subclavius,
4. Serratus Magnus,
5. Intercostales,
6. Triangularis Sterni.

The Pectoralis Major *arises* from the sternal half of the clavicle, from the whole of the anterior surface of the sternum, and from the cartilages of the third, fourth, fifth, and sixth ribs; it is *inserted* into the anterior edge of the bicipital groove of the humerus.

The Pectoralis Minor *arises* from the third, fourth, and fifth ribs, external to their cartilages; it is *inserted* into the coracoid process of the scapula.

The Subclavius *arises* from the cartilage of the first rib; it is *inserted* into the under surface of the acromial half of the clavicle.

The Serratus Magnus *arises* from the eight or nine superior ribs; it is *inserted* into the whole base of the scapula.

The INTERCOSTALES consist of eleven pairs of internal, and eleven pairs of external. The internal intercostal muscles run between the adjoining ribs, from the sternum to the angles of the ribs. The external intercostal muscles in like manner run between the adjoining ribs, but decussate with the former; they extend from the tubercles to the costal extremities of the cartilages.

The TRIANGULARIS STERNI *arises* from the thoracic surface of the lower part of the sternum and ensiform cartilage; it is *inserted* into the cartilages of the fourth, fifth, and sixth ribs.

MUSCLES OF THE SHOULDER AND ARM,—TEN.

1. Deltoides,
2. Supra Spinatus,
3. Infra Spinatus,
4. Teres Minor,
5. Teres Major,
6. Subscapularis,
7. Coraco Brachialis,
8. Biceps,
9. Brachialis Anticus,
10. Triceps Extensor Cubiti.

The DELTOIDES *arises* from the external third of the clavicle, from the acromion, and from the whole of the spine of the scapula; it is *inserted* into the rough surface on the outer side of the humerus near its middle.

The Supra Spinatus *arises* from the whole supraspinal fossa of the scapula ; it is *inserted* into the superior part of the greater tubercle of the humerus.

The Infra Spinatus *arises* from the under surface of the spine and from the convex part of the dorsum of the scapula below; it is *inserted* into the middle of the greater tubercle of the humerus.

The Teres Minor *arises* from the dorsal surface of the scapula, immediately above the inferior costa; it is *inserted* into the lower part of the greater tuberosity of the humerus.

The Teres Major *arises* from the dorsal surface of the inferior angle of the scapula ; it is *inserted* with the latissimus dorsi, into the posterior ridge of the bicipital groove of the humerus.

The Subscapularis *arises* from the whole of the subscapular fossa, and adheres very closely to the capsular ligament of the shoulder joint ; it is *inserted* into the smaller tubercle of the humerus.

The Coraco Brachialis *arises* from the coracoid process of the scapula, and from the tendon of the short head of the biceps muscle ; it is *inserted* into the inner side of the humerus near its middle.

The Biceps has a double origin. The long head *arises* from the upper part of the glenoid cavity and ligament; the short head *arises* with the coraco-brachialis from the coracoid process of the scapula: it is *inserted* into the tubercle of the radius, and by an aponeurotic expansion into the fascia of the fore-arm, which is in part derived from it.

The **Brachialis Anticus** *arises* from the whole of the fore part of the humerus, below the insertion of the deltoid muscle; it is *inserted* into the coronoid process of the ulna.

The **Triceps Extensor Cubiti** has a threefold origin; the long head *arises* from the lower border of the scapula, below its neck; the second head *arises* from the external surface of the humerus, below the insertion of the teres minor; the third, or short head, *arises* from the inner surface of the humerus, below the attachment of the teres major. The triceps is *inserted* into the olecranon process of the ulna.

MUSCLES ON THE ANTERIOR PART OF THE FORE-ARM,—EIGHT PAIRS.

1. Pronator Radii Teres,
2. Flexor Carpi Radialis,
3. Palmaris Longus,
4. Flexor Digitorum Sublimis vel Perforatus,
5. Flexor Carpi Ulnaris,
6. Flexor Pollicis Longus,
7. Flexor Digitorum Profundus vel Perforans,
8. Pronator Quadratus.

The **Pronator Radii Teres** *arises* from the internal condyle of the humerus, from the fascia of the fore arm, from the inter-muscular septa, and also from the coronoid process of the ulna; it is *inserted* into the outer part of the middle of the radius.

The Flexor Carpi Radialis *arises* from the inner condyle, and from the inter-muscular septa; it is *inserted* into the metacarpal bone of the index finger.

The Palmaris Longus *arises* from the inner condyle and from the inter-muscular septa; it is *inserted* into the annular ligament and palmar fascia.

The Flexor Digitorum Sublimis *arises* from the inner condyle, from the internal lateral ligament, from the coronoid process of the ulna, and from the radius below its tubercle; it splits into four tendons, which are fissured to allow the passage of the tendons of the profundus; they are *inserted* into the anterior surface of the middle phalanges of the four fingers.

The Flexor Carpi Ulnaris *arises* from the inner condyle, from the olecranon process, and from the edge of the ulna; it is *inserted* into the pisiform bone, and by a few fibres into the base of the fifth metacarpal bone.

The Flexor Longus Pollicis *arises* from the radius below the tubercle, and from the inter-osseous ligament, also frequently from the coronoid process of the ulna; it is *inserted* into the last phalanx of the thumb.

The Flexor Digitorum Profundus *arises* from the anterior surface of the ulna throughout the greater part of its length, from the ulnar half of the inter-osseous ligament, also sometimes from the radius, below its tubercle; it divides into four tendons, which are *inserted* into the last phalanges of the four fingers.

The Pronator Quadratus *arises* from the lower extremity of the ulna; it is *inserted* into the lower fourth of the radius.

MUSCLES ON THE OUTER AND BACK PART OF THE FORE-ARM,—TWELVE.

1. Supinator Radii Longus,
2. Extensor Carpi Radialis Longus,
3. Extensor Carpi Radialis Brevis,
4. Extensor Digitorum Communis,
5. Extensor Minimi Digiti,
6. Extensor Carpi Ulnaris,
7. Anconæus,
8. Supinator Radii Brevis,
9. Extensor Ossis Metacarpi Pollicis,
10. Extensor Primi Internodii Pollicis,
11. Extensor Secundi Internodii Pollicis.
12. Extensor Indicis.

The Supinator Radii Longus *arises* from the external ridge of the humerus, below the insertion of the deltoid muscle, and from the inter-muscular septum; it is *inserted* into the outer side of the radius, near its styloid process.

The Extensor Carpi Radialis Longus *arises* from the external inter-muscular ridge and septum of the humerus, below the supinator longus; it is *inserted* into the dorsal surface of the base of the metacarpal bone of the index finger.

The Extensor Carpi Radialis Brevis *arises* from the outer condyle of the humerus, and from the external lateral ligament; it is *inserted* into the base of the third metacarpal bone.

The Extensor Digitorum Communis *arises* from the external condyle, from the inter-muscular septa. and from the fascia of the fore arm; it divides into four tendons for the fingers, which are *inserted* into the back of all the three phalanges.

The Extensor Minimi Digiti *arises* in common with the last muscle, of which it appears to be a portion; it is *inserted* with the fourth tendon of the common extensor into the three phalanges of the little finger.

The Extensor Carpi Ulnaris *arises* from the external condyle, from the inter-muscular septa, from the fascia, and also from the middle third of the ulna; it is *inserted* into the base of the fifth metacarpal bone.

The Anconæus *arises* from the inferior part of the external condyle; it is *inserted* into the external edge of the olecranon process and upper part of the ulna.

The Supinator Radii Brevis *arises* from the external condyle, from the external lateral ligament, and from a ridge on the outer and upper part of the ulna; it is *inserted* into the anterior and outer part of the upper third of the radius.

The Extensor Ossis Metacarpi Pollicis *arises* from the ulna below the anconæus, from the inter-osseous ligament, and from the radius; it is *inserted*, by two tendons, into the trapezium and base of the metacarpal bone of the thumb.

The Extensor Primi Internodii Pollicis *arises* from the radius, from the inter-osseous ligament, and from the ulna; it is *inserted* into the first phalanx of the thumb.

The Extensor Secundi Internodii Pollicis *arises* from the ulna and from the inter-osseous ligament; it is *inserted* into the base of the second phalanx of the thumb.

The Extensor Indicis *arises* from near the middle of the posterior surface of the ulna and from the inter-osseous ligament; it is *inserted*, with the first tendon of the common extensor, into the phalanges of the index finger.

MUSCLES OF THE HAND,—ELEVEN.

1. Palmaris Brevis,
2. Abductor Pollicis,
3. Opponens Pollicis,
4. Flexor Brevis Pollicis,
5. Adductor Pollicis,

6. Abductor Indicis,
7. Lumbricales,
8. Abductor Minimi Digiti,
9. Flexor Brevis Minimi Digiti,
10. Adductor Minimi Digiti,
11. Interossei.

The Palmaris Brevis *arises* from the annular ligament and palmar fascia; it is *inserted* into the integuments on the inner side of the palm of the hand.

The Abductor Pollicis *arises* from the annular ligament and from the trapezium; it is *inserted* into the outer side of the base of the first phalanx of the thumb.

The Opponens Pollicis *arises* from the annular ligament and from the trapezium; it is *inserted* into the outer side of the metacarpal bone of the thumb.

The Flexor Brevis Pollicis is divided into two portions by the flexor longus, the one *arises* from the annular ligament and trapezium, and is *inserted* into the external sesamoid bone and base of the first phalanx: the other *arises* from the trapezoides and magnum, and is *inserted* into the inner sesamoid bone and base of the first phalanx of the thumb.

The Adductor Pollicis *arises* from the anterior surface of the third metacarpal bone; it is *inserted* into the base of the first phalanx of the thumb.

The Abductor Indicis *arises* from the metacarpal bone of the first finger, from part of that of the thumb, and also by a few fibres from the trapezium; it is *inserted* into the outer side of the base of the first phalanx of the indicator.

The LUMBRICALES are four small muscles which *arise* from the outer side of the four tendons of the flexor profundus; they are *inserted* into the expansion of the extensor tendons, on the back of each finger.

The ABDUCTOR MINIMI DIGITI *arises* from the annular ligament and from the pisiform bone; it is *inserted* into the ulnar side of the first phalanx of the little finger.

The FLEXOR BREVIS MINIMI DIGITI *arises* from the annular ligament and from the unciform bone: it is *inserted* into the base of the first phalanx of the little finger.

The ADDUCTOR MINIMI DIGITI *arises* from the annular ligament and from the unciform bone; it is *inserted* into the whole length of the metacarpal bone of the little finger.

The INTEROSSEI fill up the space between the metacarpal bones; they are divided into a palmar and a dorsal set.

The Palmar consists of four muscles: the first *arises* from the radial side of the second metacarpal bone, and is *inserted* into the outer side of the first phalanx of the fore finger. The second *arises* from the ulnar side of the same metacarpal bone, and is *inserted* into the inner side of the first phalanx of the fore finger. The third *arises* from the radial side of the fourth metacarpal bone, and is *inserted* into the outer side of the first phalanx of the ring finger. The fourth *arises* from the radial side of the fifth metacarpal bone, and is *inserted* into the outer side of the first phalanx of the little finger.

The Posterior Interossei are three in number: the first *arises* from the second and third metacarpal bones, and is *inserted* into the outer side of the first phalanx of the middle finger. The second arises from the third and fourth metacarpal bones, and is *inserted* into the inner side of the first phalanx of the middle finger. The third *arises* from the fourth and fifth metacarpal bones, and is *inserted* into the inner side of the first phalanx of the ring finger.

SUPERFICIAL ABDOMINAL MUSCLES,—FIVE PAIRS; AND ONE PAIR OF SMALL MUSCLES BELONGING TO THE ORGANS OF GENERATION.

1. Obliquus Externus Abdominis.
2. Obliquus Internus Abdominis,
3. Cremaster,
4. Transversalis Abdominis,
5. Rectus Abdominis,
6. Pyramidalis.

The Obliquus Externus *arises* from the eight inferior ribs, external to their cartilages; it is *inserted* into the anterior half of the outer lip of the crista ilii, and into the median line (linea alba) formed by the aponeurotic fibres of the opposite muscles; this line extends from the ensiform cartilage to the pubis. Poupart's ligament is formed by the inferior cord-like boundary of the tendon of the external oblique muscle, and extends from the superior anterior spine of the ilium to the pubis.

The Obliquus Internus *arises* from the lumbar vertebræ by the fascia lumborum, from nearly the whole of the crista ilii, and from the external half, or rather more, of poupart's ligament; it is *inserted* into the cartilages of the seven inferior ribs, into the ensiform cartilage, into the whole of the linea alba, and with the transversalis into the pubis.

The Cremaster *arises* from poupart's ligament, and appears like a few fibres given off from the lower edge of the internal oblique; it is *inserted* into the tunica vaginalis.

The Transversalis *arises* from the lumbar vertebræ by the fascia lumborum, from the inner surface of the six inferior ribs, from nearly the whole of the inner lip of the crista ilii, and from the outer half of poupart's ligament; it is *inserted* with the posterior layer of the tendon of the internal oblique, which it joins at the linea semilunaris, into the whole length of the linea alba, from the ensiform cartilage to the pubis, and also into the linea ilio-pectinea. From the ensiform cartilage to mid-way between the umbilicus and pubis, the rectus is enclosed in the combined tendons of the internal oblique and transversalis, one layer passing before, the other behind the rectus; below this point the whole tendon passes anterior to the rectus.

The **Rectus** *arises* from the upper part of the body of the pubis ; it is *inserted* into the ensiform cartilage, with its external ligament, and into the fifth and sixth ribs.

The **Pyramidalis** *arises* from the pubis; it is *inserted* into the linea alba, mid-way between the umbilicus and pubis.

MUSCLES WITHIN THE ABDOMEN,—FOUR PAIRS AND ONE SINGLE.

1. Diaphragma, (single)
2. Quadratus Lumborum,
3. Psoas Parvus,
4. Psoas Magnus,
5. Iliacus Internus.

The **Diaphragm** consists of the superior or greater muscle, and the two crura. The superior muscle *arises* from the posterior surface of the ensiform cartilage, from the cartilages of the seven inferior ribs, and from the ligament which extends from the first lumbar vertebra to the last rib; the fibres converge to be *inserted* into the central cordiform tendon. The right crus or appendix is the larger, it *arises* from the bodies and inter-vertebral substances of the four upper lumbar vertebræ ; the left crus *arises* from the three upper lumbar vertebræ. These crura ascend on either side the aorta, across which, each crus sends a fasciculus of fibres to the opposite side ;

these are called the *decussating fibres*, (the right fasciculus is the larger), and separate the aortic from the œsophageal opening; the crura are *inserted* into the posterior border of the cordiform tendon.

The Quadratus Lumborum *arises* from the posterior fourth of the crista ilii, and from the ilio-lumbar ligament; it is *inserted* into the transverse processes of the four upper lumbar vertebræ, and into the last rib for about half its length.

The Psoas Parvus *arises* from the side of the bodies of the last dorsal and the first lumbar vertebræ; it is *inserted* into the linea ilio-pectinea, behind the femoral vessels.

The Psoas Magnus *arises* from the body of the last dorsal, and from the bodies and transverse processes of all the lumbar vertebræ, and their intervertebral substances; it is *inserted* into the lesser trochanter, and into the ridge below it.

The Iliacus Internus *arises* from the transverse process of the last lumbar vertebra, from the greater part of the crista of the ilium, from the two anterior spinous processes, and from the iliac fossa; it is *inserted*, with the psoas magnus, into the lesser trochanter, and into the oblique ridge below it.

PERINÆAL MUSCLES IN THE MALE,—SEVEN PAIRS.

1. Sphincter Ani Externus,
2. Sphincter Ani Internus,

3. Erector Penis,
4. Accelerator Urinæ,
5. Transversus Perinæi,
6. Levator Ani,
7. Coccygeus.*

The Sphincter Ani Externus surrounds the anus as an orbicular muscle; it *arises* from the apex of the coccyx, and is *inserted* into the common tendinous point of the perinæum, and into the integuments.

The Sphincter Ani Internus surrounds the lower end of the rectum, and consists of the circular fibres of the gut more developed than they are above.

The Erector Penis *arises* from the inner surface of the tuber ischii; it is *inserted* into the fibrous membrane of the corpus cavernosum.

The Accelerator Urinæ *arises*, in common with that of the opposite side, from the median line under the bulb of the urethra, from whence the fibres proceed in three directions. The posterior pass outwards to be *inserted* into the triangular ligament near to the ramus of the pubis; the middle fibres pass round the urethra on to its upper surface, to *join* with those of the opposite muscle, while the anterior fibres are *inserted* into the side of the corpus cavernosum.

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*A few fibres, which are attached to the descending ramus of the pubis above the erector penis, pass upwards and inwards over the root of the penis, and unite under the symphysis in a common tendon with the corresponding muscle of the opposite side; this tendon, from its position, can compress the dorsal vein; the fibres have recently been described as a distinct muscle, under the name of Compressor Venæ Dorsalis Penis.

The TRANSVERSALIS PERINÆI *arises* from the tuber ischii; it is *inserted* into the central point of the perinæum; in some there is a second small muscle pursuing a similar course,—the transversalis perinæi alter.

The LEVATOR ANI *arises* from the posterior surface of the pubis, near the symphysis, from the ilium above the obturator foramen, from the ischium and its spinous process, and also from the obturator fascia; it is *inserted* into the common central point of the perinæum, beneath the membranous part of the urethra and prostrate gland, into the sides of the rectum, into the ligamentous expansion between the rectum and coccyx, and also into the side of the coccyx itself. The anterior fibres which surround the urethra are described by some as a distinct muscle, under the name of Compressor Urethra.

The COCCYGEUS *arises* from the spine of the ischium; it is *inserted* into the side of the coccyx and into the lower part of the sacrum.

In the female, instead of the erector penis, there is a smaller muscle, the erector clitoridis; and in place of the accelerator urinæ, there is the constrictor vaginæ, which embraces the vagina, extending from the central perinæal point to the clitoris. The other muscles are similar to those in the male.

MUSCLES ON THE ANTERIOR PART OF THE THIGH,—NINE.

1. Tensor Vaginæ Femoris,
2. Sartorius,
3. Rectus Femoris,
4. Vastus Externus,
5. Vastus Internus,
6. Cruræus,
7. Gracilis,
8. Pectineus,
9. Triceps Adductor Femoris.

The Tensor Vaginæ *arises* from the outer side of the superior anterior spinous process of the ilium; it is *inserted* into the fascia lata, on the outside of the thigh.

The Sartorius *arises* from the superior anterior spinous process of the ilium, and from the notch immediately below; it is *inserted* by an aponeurotic expansion into the tibia, below its tuberosity.

The Rectus *arises* from the inferior anterior spine of the ilium, and from above the acetabulum; it is *inserted*, by a common tendon, with the two vasti and cruræus, into the patella.

The Vastus Exteruns *arises* from the inferior surface of the greater trochanter, from the outer lip of the linea aspera down to the outer condyle, and from the outer surface of the femur; it is *inserted* into the patella.

The VASTUS INTERNUS *arises* from the inter-trochanteric line, from the inner lip of the linea aspera, and from the inner surface of the femur ; it is *inserted* into the patella by the common tendon.

The CRURÆUS *arises* from the anterior and outer surface of the femur, (not from the inner surface), below the trochanters; it is *inserted* by the common tendon into the patella.

The GRACILIS *arises* from the lower part of the body of the pubis, close to the symphysis, and from its descending ramus ; it is *inserted* into the inner surface of the tibia, directly below the tuberosity.

The PECTINEUS *arises* from the anterior surface of the body of the pubis ; it is *inserted* into the line which leads from the lower trochanter to the linea aspera.

The TRICEPS ADDUCTOR consists of three distinct muscles ; the adductor longus *arises* from the body of the pubis, between the symphysis and spinous process ; it is *inserted* into the middle third of the linea aspera : the adductor brevis *arises* from the body of the pubis below the adductor longus, between the thyroid foramen and the symphysis ; it is *inserted* into the oblique line below the small trochanter, and into the upper part of the linea aspera : the adductor magnus *arises* from the tuberosity and ramus of the ischium, and from the descending ramus of the pubis ; it is *inserted* into the ridge extending from trochanter major to the linea aspera, into the whole extent of this latter, and also by a round tendon into the inner condyle.

MUSCLES OF THE HIP AND BACK OF THE THIGH,— TWELVE.

1. Glutæus Maximus,
2. Glutæus Medius,
3. Glutæus Minimus,
4. Pyriformis,
5. and 6. Gemelli, Superior et Inferior,
7. Obturator Internus,
8. Obturator Externus,
9. Quadratus Femoris,
10. Biceps Flexor Cruris,
11. Semi Tendinosus,
12. Semi Membranosus.

The Glutæus Maximus *arises* from the posterior fifth of the crista of the ilium, from the bone immediately below it, from the posterior surface of the sacrum, from the coccyx, and from the greater sacro-sciatic ligament; it is *inserted* into the upper third of the linea aspera, and into the line which extends from it to the great trochanter.

The Glutæus Medius *arises* from the anterior four fifths of the outer lip of the crista ilii, from that part of the dorsum of the bone which is between the crista and the superior semicircular ridge, and from immediately below this ridge; it is *inserted* with the smaller glutæus into the upper and outer part of the great trochanter.

The Glutæus Minimus *arises* from the dorsum of the ilium, between the superior semicircular ridge and the brim of the acetabulum; it is *inserted* with the last muscle into the great trochanter.

The Pyriformis *arises* within the pelvis, from the second, third, and fourth pieces of the sacrum, and slightly from the posterior part of the ilium; it is *inserted* into the upper part of the trochanteric fossa.

The Gemelli; the superior *arises* from the spine of the ischium, the inferior from the upper part of its tuberosity; they are *inserted* with the obturator internus into the trochanteric fossa.

The Obturator Internus *arises* within the pelvis, from the obturator ligament and surrounding margin of the obturator foramen, also from the obturator fascia; the tendon passes out of the pelvis at the lesser sciatic notch, between the two gemelli, to be *inserted* with them into the trochanteric fossa.

The Obturator Externus *arises* from the outer surface of the obturator ligament, and from the surrounding margin of bone; it is *inserted* into the lower part of the trochanteric fossa.

The Quadratus Femoris *arises* from the external surface of the tuber ischii; it is *inserted* into the lower part of the great trochanter, and into the inter-trochanteric line.

The Biceps has a double origin: the long head *arises* from the upper part of the tuber ischii in common with the semi-tendinosus; the short head *arises* from the linea aspera, below the insertion of the glutæus maximus; it is *inserted* into the head of the fibula.

The SEMI TENDINOSUS *arises* from the tuber ischii with the tendon of the biceps, and also from this tendon for two or three inches; it is *inserted* into the fore part of the tibia, below its tuberosity.

The SEMI MEMBRANOSUS *arises* from the posterior part of the tuber ischii; it has a triple *insertion*,—1. by a strong aponeurosis, which is continuous with the deep fascia of the leg; 2. into the external condyle, by which it covers the posterior part of the knee joint, and assists in forming the posterior ligament of this articulation; 3. into the head of the tibia.

MUSCLES ON THE FORE AND OUTER PART OF THE LEG, —SIX; ON THE DORSUM OF THE FOOT,—ONE.

1. Tibialis Anticus,
2. Extensor Digitorum Longus,
3. Extensor Pollicis Proprius,
4. Peronæus Longus,
5. Peronæus Brevis,
6. Peronæus Tertius,
7. Extensor Digitorum Brevis.

The TIBIALIS ANTICUS *arises* from the two superior thirds of the outer surface of the tibia, from the inter-osseous ligament, and from the inter-muscular fascia; it is *inserted* into the internal cuneiform, and into the base of the first metatarsal bones.

The Extensor Digitorum Longus *arises* from the head of the tibia, from the head and about the two upper thirds of the fibula, from the inter-osseous ligament, and from the inter-muscular septa; it divides into three tendons, which pass under the annular ligament, the inner then dividing into two; the four tendons are *inserted* into the last phalanges of the four smaller toes.

Peronæus Tertius. The muscle to which this name has been given, is in reality only the lower portion of the extensor digitorum longus; it *arises* from the inferior half of the fibula, and is *inserted* into the base of the fifth metatarsal bone.

The Extensor Pollicis Proprius *arises* from the middle portion of the fibula, and from the lower part of the inter-osseous ligament; it is *inserted* into the two phalanges of the great toe.

The Peronæus Longus *arises* from the head of the tibia, from the head and superior half of the outer angle of the fibula, and from the inter-muscular fascia; it is *inserted* into the first and second metatarsal bones, and also into the internal cuneiform.

The Peronæus Brevis *arises* from the inferior half of the fibula, and from the inter-muscular fascia; it is *inserted* into the under surface of the base of the fifth metatarsal bone.

The Extensor Digitorum Brevis *arises* from the upper part of the os calcis, and from the ligament connecting it with the astragalus; it divides into four tendons, the first of which is *inserted* into the base of the first phalanx of the great toe, the other three joining the outer side of the long extensor tendons, with which they are *inserted* into the three middle toes, the little toe not receiving any.

MUSCLES ON THE POSTERIOR PART OF THE LEG,—SEVEN.

These are arranged into a superficial and a deep layer.

The superficial layer has three muscles.

1. Gastrocnemius,
2. Plantaris,
3. Solæus.

The deep layer has four muscles.

1. Poplitæus,
2. Flexor Digitorum Longus vel Perforans,
3. Tibialis Posticus,
4. Flexor Pollicis Longus.

The Gastrocnemius *arises* by two heads; the larger or inner from the upper and back part of the internal condyle, and from the ridge above it; the external head, in the same manner, from the outer condyle; the muscle forms, with the solæus, a common tendon (tendo achillis), which is *inserted* into the tuberosity of the os calcis.

The PLANTARIS *arises* from the femur, above the external condyle; it is *inserted* into the posterior part of the os calcis.

The SOLÆUS has a double origin: the outer or larger head *arises* from the posterior surface of the head, and upper third of the fibula; the inner head *arises* from the posterior surface of the tibia, below the insertion of the poplitæus; it is *inserted* by the tendo achillis into the lower and hinder part of the calcis.

The POPLITÆUS *arises* from a depression on the outer and lower part of the external condyle; it is *inserted* into the posterior and upper part of the tibia, above the popliteal ridge.

The FLEXOR DIGITORUM LONGUS *arises* from the posterior surface of the tibia, below the insertion of the poplitæus; it becomes tendinous, and passes behind the inner malleolus with the tibialis posticus, into the sole of the foot, where it expands and receives the insertion of the musculus accessorius; it then divides into four tendons, which, after passing through fissures in the short flexor tendons, are *inserted* into the last phalanges of the four outer toes.

The TIBIALIS POSTICUS *arises* from the upper part of the tibia, from the upper and inner part of the fibula, and from a great portion of the inter-osseous ligament; it is principally *inserted* into the os scaphoides, and by a tendinous expansion it is also connected to the three cuneiform and cuboid bones.

The Flexor Pollicis Longus *arises* from the lower part of the fibula and from the inter-muscular fascia, it passes behind the inner malleolus, nearer to the heel than the tendons of the flexor communis and tibialis posticus, from which it is separated by the posterior tibial vessels and nerve; it is *inserted* into the last phalanx of the great toe.

MUSCLES IN THE SOLE OF THE FOOT,—TEN.

These muscles consist of an inner set proper to the great toe, a middle set common to the toes, and an external set proper to the little toe; they are arranged into four layers.

(The sole of the foot being uppermost.)

First or Superficial Layer.

1. Abductor Pollicis,
2. Flexor Digitorum Brevis vel Perforatus,
3. Abductor Minimi Digiti.

Second Layer.

4. Musculus Accessorius,
5. Lumbricales.

Third Layer.

6. Flexor Pollicis Brevis,

7. Adductor Pollicis,
8. Flexor Minimi Digiti,
9. Transversalis Pedis.

Fourth Layer.

10. The Interossei.

The Abductor Pollicis *arises* from the lower and inner part of the calcaneum, from the internal annular ligament, from the inter-muscular septum, and from the plantar fascia; it is *inserted* into the internal sesamoid bone, and base of the first phalanx of the great toe.

The Flexor Digitorum Brevis *arises* from the inferior surface of the os calcis, from the plantar fascia, and from the inter-muscular septa; it divides into four tendons, which pass with the long flexor tendons to the four lesser toes, into the middle phalanges of which they are *inserted,* after splitting to give passage to the long tendons.

The Abductor Minimi Digiti *arises* from the outer part of the calcis, from the strong ligament which extends from it to the fifth metatarsal bone, and also from the base of the latter; it is *inserted* into the base of the first phalanx of the little toe.

The Musculus Accessorius *arises* from the inner and under part of the calcis; it is *inserted* into the outer part of the tendon of the flexor longus communis.

The Lumbricales form four small muscles, which *arise* from the tendons of the long flexor, they pass to be *inserted* into the base of the first phalanges of the four smaller toes, and also to join the extensor tendons on the dorsum of the toes.

The Flexor Pollicis Brevis *arises* from the under and outer part of the os calcis, and from the external cuneiform bone; it is *inserted* into the outer side of the base of the first phalanx of the great toe, and into the external sesamoid bone.

The Adductor Pollicis *arises* from the cuboid, from the middle and external cuneiform bones, and also from the base of the second and third metatarsal bones; it is *inserted* with the last muscle into the base of the first phalanx of the great toe, and external sesamoid bone.

The Flexor Minimi Digiti *arises* from the cuboid and fifth metatarsal bones, and from the sheath of the peronæus longus tendon; it is *inserted* into the base of the first phalanx of the little toe.

The Transversalis Pedis *arises* from the heads of the four outer metatarsal bones; it is *inserted* with the adductor pollicis into the external sesamoid bone.

The Interossei are seven in number, they are divided into a plantar and a dorsal set.

The Plantar, or inferior interossei, are three; the first is placed between the second and third metatarsal bones, from which it *arises*; it is *inserted* into the inner side of the first phalanx, and into the extensor tendons of the third toe. The second *arises* from the third and fourth metatarsal bones; it is *inserted* into the inner side of the first phalanx, and into the extensor tendons of the fourth toe. The third *arises* from the fourth and fifth metatarsal bones; it is *inserted* into the inner side of the first phalanx, and also into the extensor tendons of the little toe.

The Dorsal, or superior set, are the largest; they are four in number. The first *arises* from the first and second metatarsal bones; it is *inserted* into the inner side of the first phalanx, and into the extensor tendons of the second toe. The second muscle *arises* from the second and third metatarsal bones; it is *inserted* into the outer side of the first phalanx, and into the extensor tendons of the second toe. The third muscle *arises* from the third and fourth metatarsal bones; it is *inserted* into the outer side of the first phalanx, and also into the extensor tendons of the third toe. The fourth muscle *arises* from the fourth and fifth metatarsal bones; it is *inserted* into the outer side of the first phalanx, and into the extensor tendons of the fourth toe.

CLASSIFICATION OF MUSCLES

ACCORDING TO THEIR ACTIONS.

In the foregoing pages the origin and insertion of muscles are given as briefly as possible; it is however, not only useful, but absolutely essential, constantly to bear in mind their combined actions. In the following tables those muscles are grouped together, which from position or function, should be studied at the same time. It will be observed that many muscles are mentioned more than once, this is because they have more than one simple direct action, while the functions of others are not enumerated, because their names and positions sufficiently call to mind their uses; or else, that the actions of several are rather to be regarded as one compound whole, (as in those of the back), to attempt to analyze the individual actions of which, would be too complicated and tedious for the plan of this work, and at the same time attended with little benefit. For the same reason, only those muscles which act more directly on any part are given; but it must not be forgotten that, in most cases, these are much assisted in delicacy and variety of action by the indirect co-operation, so to speak, of those muscles which more particularly belong to other parts.

MUSCLES OF THE EYE-LIDS,—TWO.

Levator Palpebræ Superioris,
Orbicularis Palpebrarum.

MUSCLES OF THE EYE,—SIX.

Attollens Occuli, vel Rectus Superior,
Depressor Oculi, vel Rectus Inferior,
Abductor Oculi, vel Rectus Externus,
Adductor Oculi, vel Rectus Internus,
Obliqui, Superior et Inferior.

MUSCLES OF THE NOSTRILS,—FOUR.

Dilators,—two.

Pyramidalis Nasi,
Levator Labii Superioris Alæque Nasi.

Contractors,—two.

Compressor Nasi,
Depressor Labii Superioris Alæque Nasi.

MUSCLES OF THE MOUTH,—TEN.

Dilators,—seven.

Levator Labii Superioris Alæque Nasi,
Levator Anguli Oris,
Zygomatici, Major et Minor,
Depressor Labii Inferioris,
Depressor Anguli Oris,
Buccinator.

Contractors,—three.

Orbicularis Oris,
Depressor Labii Superioris Alæque Nasi,
Levator Labii Inferioris.

MUSCLES OF THE LOWER JAW,—TEN.

Levators,—three.

Temporalis,
Masseter,
Pterygoideus Internus.

Rotators Laterally,—two.

Pterygoidei, Externus et Internus.

Depressors,—five.

Platysma Myoides,

Digastricus,
Mylo-hyoideus,
Genio-hyoideus,
Genio-hyo-glossus.

MUSCLES OF THE TONGUE,—FOUR.

Stylo-glossus,
Hyo-glossus,
Lingualis,
Genio-hyo-glossus.

MUSCLES OF THE PALATE,—FIVE.

Levator Palati,
Circumflexus Palati,
Motor Uvulæ,
Palato-glossus,
Palato-pharyngeus.

MUSCLES OF THE PHARYNX,—FOUR.

Stylo-pharyngeus,
Constrictores Pharyngis, Superior, Medius, et Inferior.

MUSCLES OF THE OS HYOIDES,—NINE.

Levators,—five.

Digastricus,
Stylo-hyoideus,
Mylo-hyoideus,
Genio-hyoideus,
Genio-hyo-glossus.

Depressors,—four.

Sterno-hyoideus,
Sterno-thyroideus,
Thyro-hyoideus,
Omo-hyoideus.

The depressors of the os hyoides are important in the motions of the lower jaw, by fixing the os hyoides, they afford a firm point for the action of the muscles between it and the jaw. Deglutition is accomplished by the combined action of the muscles of the tongue, palate, os hyoides, and pharynx.

MUSCLES OF THE LARYNX,—FIVE.

Dilators of the Rima Glottidis,—two.

Crico-thyroideus,
Crico-arytenoideus Posticus.

Contractors of the Rima Glottidis,—three.

Crico-arytenoideus Lateralis,
Thyro-arytenoideus,
Arytenoideus.

It must be observed, that although the crico-arytenoidei laterales contract the rima from before to behind, they enlarge it from side to side; and the thyro-arytenoidei may in some cases also assist in dilating the rima.

MUSCLES OF THE BACK,—TWENTY-FIVE.

These may be arranged either in seven or four layers.

1st.—Arranged in seven layers,

The first layer contains two.

Trapezius,
Latissimus Dorsi.

The second layer contains three.

Levator Anguli Scapulæ,
Rhomboidei, Major et Minor,

The third layer contains two.

Serrati Postici, Superior et Inferior.

The fourth layer contains four.

Sacro-lumbalis,
Longissimus Dorsi,
Spinalis Dorsi,
Splenius.

The fifth layer contains four.

Cervicalis Ascendens,
Transversalis Colli,
Trachelo-mastoideus,
Complexus.

The sixth layer contains six.

Recti Capitis Postici, Major et Minor,
Obliqui Capitis, Superior et Inferior,
Semi-spinalis Colli,
Semi-spinalis Dorsi.

The seventh layer contains four.

Multifidus Spinæ,
Inter-spinales,
Inter-transversales,
Levatores Costarum.

2nd.—Arranged in four layers.

The first layer contains two.

Trapezius,
Latissimus Dorsi.

The second layer contains six.

Rhomboidei, Major et Minor,
Serrati Postici, Superior et Inferior,
Levator Anguli Scapulæ,
Splenius.

The third layer contains seven.

Sacro-lumbalis,
Longissimus Dorsi,
Spinalis Dorsi,
Cervicalis Ascendens.
Transversalis Colli,
Trachelo mastoideus,
Complexus.

The fourth layer contains ten.

Recti Capitis Postici, Major et Minor,
Obliqui Capitis, Superior et Inferior,
Semi-spinalis Colli,
Semi-spinalis Dorsi,
Multifidus Spinæ,
Inter-spinales,
Inter-transversales,
Levatores Costarum.

MUSCLES OF THE HEAD.

Direct motion of the head is performed through two articulations; extension and flexion are accomplished by the motion of the occipital condyles upon the atlas; lateral or rotatory motion, by the atlas moving upon the vertebra dentata; to both joints are attached proper muscles; but the extensive motion which the head enjoys is the result of the combined movements of different portions, or even of the whole vertebral column, through the medium of most of the muscles attached to the trunk.

Flexors forwards,—four.

Platysma Myoides,
Sterno-cleido-mastoideus,
Recti Capitis Antici, Major et Minor,

Flexors laterally,—three.

Rectus Capitis Lateralis,
Obliquus Capitis Superior,
Upper part of Trapezius.

Extensors,—seven.

Upper part of the Trapezius,
Splenius Capitis,
Trachelo-mastoideus,
Complexus,
Recti Capitis Postici, Major et Minor,
Obliquus Capitis Superior.

Rotators,—seven, (which, for example, turn the chin towards the right shoulder.)

Right Platysma Myoides,
Left Sterno-mastoideus,
Right Splenius Capitis,
Right Trachelo-mastoideus,
Left Complexus,
Right Rectus Capitis Posticus Major,
Right Obliquus Capitis Inferior.

MUSCLES OF RESPIRATION.

These may be classed into those which act when the breathing is natural, or but moderately forced; and those which, in addition to the former, are called into action when this function is violently or distressingly excited.

1st Respiration, natural and moderate.

Inspiration.

Diaphragma,
Intercostales,
Levatores Costarum.

Expiration.

Principally by the relaxation of the diaphragm and the elasticity of the ribs, assisted by the five pairs of abdominal muscles.

2nd Respiration, laborious.

Inspiration.

Sterno-cleido-mastoideus,
Scaleni, Anticus, Medius, et Posticus,
Serratus Magnus,
Serratus Posticus Superior,
Subclavius,
Pectorales, Major et Minor,
Latissimus Dorsi,
Cervicalis Ascendens,
Musculi Accessorii ad Sacro-lumbalem.

Expiration.

Triangularis Sterni,
Serratus Posticus Inferior,
Sacro-lumbalis,
Longissimus Dorsi,
Quadratus Lumborum.

The Intercostales, when the last rib is depressed by the Quadratus Lumborum, may also assist in expiration.

MUSCLES WHICH ATTACH THE SCAPULA TO THE TRUNK, —SEVEN DIRECTLY, THREE INDIRECTLY.

Directly,—seven.

Trapezius,
Rhomboidei, Major et Minor,
Levator Anguli Scapulæ,
Omo-hyoideus,
Serratus Magnus,
Pectoralis Minor.

Indirectly,—three.

Subclavius,
Pectoralis Major,
Latissimus Dorsi.

MUSCLES OF THE SHOULDER JOINT,—NINE.

Pectoralis Major,
Latissimus Dorsi,
Teres Major,
Deltoides,
Supra-spinatus,
Infra-spinatus,
Subscapularis,
Teres Major,
Coraco-brachialis.

Levators,—five.

Middle portion of Deltoides,
Upper part of Pectoralis Major,
Supra-spinatus,
Coraco-brachialis,
Biceps.

Depressors,—six.

Pectoralis Major,
Latissimus Dorsi,
Teres Major,
Anterior and Posterior portions of Deltoides,
Inferior portion of Subscapularis,
Long head of Triceps.

Adductors,—four.

Pectoralis Major,
Anterior portion of Deltoides,
Biceps,
Coraco-brachialis.

Abductors,—four.

Latissimus Dorsi,
Teres, Major et Minor,
Posterior portion of Deltoides,
Long head of Triceps.

Rotators inwards,—five.

Anterior portion of Deltoides,

Pectoralis Major,
Subscapularis,
Latissimus Dorsi,
Teres Major.

Rotators outwards,—five.

Posterior portion of Deltoides,
Supra-spinatus,
Infra-spinatus,
Teres Minor,
Coraco-brachialis.

MUSCLES OF THE ELBOW JOINT,—FOUR.

Flexors,—two.

Biceps,
Brachialis Anticus.

Extensors,—two.

Triceps,
Anconæus.

MUSCLES OF THE RADIO-ULNAR ARTICULATIONS,—FOUR.

Pronators,—two.

Pronator Radii Teres,
Pronator Quadratus.

Supinators,—two.

Supinator Radii Longus,
Supinator Radii Brevis.

MUSCLES OF THE RADIO-CARPAL ARTICULATION,—SIX.

Flexors,—three.

Flexor Carpi Radialis,
Flexor Carpi Ulnaris,
Palmaris Longus.

Extensors,—three.

Extensor Carpi Radialis Longus,
Extensor Carpi Radialis Brevis,
Extensor Carpi Ulnaris.

These muscles are materially assisted by the long muscles of the fingers.

MUSCLES BELONGING TO THE FASCIA AND INTEGUMENTS OF THE PALM,—TWO.

Palmaris Longus,
Palmaris Brevis.

MUSCLES COMMON TO THE FOUR FINGERS,—FIVE.

Flexors,—three.

Flexor Digitorum Sublimis,
Flexor Digitorum Profundis,
Lumbricales.

Extensor,—one.

Extensor Digitorum Communis.

The Interossei are both adductors and abductors.

MUSCLES PROPER TO THE THUMB,—SEVEN.

Flexors,—three.

Flexor Pollicis Longus,
Flexor Pollicis Brevis,
Opponens Pollicis.

Extensors,—three.

Extensor Ossi Metacarpi Pollicis,
Extensor Primi Internodii Pollicis,
Extensor Secundi Internodii Pollicis.

Abductor et Adductor Pollicis.

MUSCLES PROPER TO THE FORE FINGER,—TWO.

Extensor Indicis,
Abductor Indicis.

MUSCLES PROPER TO THE LITTLE FINGER,—FOUR.

Extensor Minimi Digiti,
Flexor Brevis Minimi Digiti,
Abductor Minimi Digiti,
Adductor Minimi Digiti.

MUSCLES OF THE ABDOMEN,—FIVE.

Obliqui, Externus et Internus,
Transversalis,
Rectus,
Pyramidalis.

MUSCLES BELONGING TO THE ORGANS OF GENERATION,—FIVE.

In the Male.

Cremaster,
Transversalis Perinæi,

Transversalis Perinæi Alter,
Erector Penis,
Accelerator Urinæ.

In the Female.

Transversalis Perinæi,
Transversalis Perinæi Alter,
Erector Clitoridis,
Constrictor Vaginæ.

MUSCLES OF THE HIP-JOINT,—FOURTEEN.

Iliacus Internus,
Psoas Magnus,
Pectineus,
Triceps Adductor Femoris,
Tensor Vaginæ Femoris,
Glutæi, Maximus, Medius, et Minimus,
Pyriformis,
Obturatores, Internus et Externus,
Gemelli, Superior et Inferior,
Quadratus Femoris.

Flexors,—nine.

Iliacus Internus,
Psoas Magnus,
Pectineus,
Triceps, (long and short heads of)
Tensor Vaginæ Femoris,

Sartorius,
Rectus,
Anterior portions of the Glutæi, Medius et Minimus.

Extensors,—eight.

Glutæi, Maximus, Medius, et Minimus,
Posterior portion of Adductor Magnus,
Pyriformis,
Semi-membranosus,
Semi-tendinosus,
Long head of Biceps.

Adductors,—eight.

Triceps Adductor Femoris,
Pectineus,
Gracilis,
Iliacus Internus,
Psoas Magnus,
Sartorius,
Obturator Externus,
Quadratus Femoris.

Abductors,—eight.

Glutæi, Maximus, Medius, et Minimus,
Tensor Vaginæ Femoris,
Pyriformis,
Gemelli, Superior et Inferior,
Obturator Internus.

Rotators outwards,—thirteen.

Iliacus Internus,
Psoas Magnus,
Pectineus,
Triceps Adductor,
Glutæus Maximus,
Posterior portions of the Glutæi, Medius et Minimus,
Pyriformis,
Gemelli, Superior et Inferior,
Obturatores, Internus et Externus,
Quadratus Femoris.

Rotators inwards,—five.

Tensor Vaginæ Femoris,
Anterior portions of the Glutæi, Medius et Minimus,
Semi-tendinosus, } when the leg is extended.
Gracilis, }

MUSCLES OF THE KNEE-JOINT,—TEN.

Flexors,—six.

Sartorius,
Gracilis,

Semi-tendinosus,
Semi-membranosus,
Biceps Flexor Cruris,
Poplitæus.

Extensors,—four.

Rectus Femoris,
Vasti, Internus et Externus,
Cruræus.

MUSCLES OF THE ANKLE JOINT,—EIGHT.

Flexors,—two.

Tibialis Anticus,
Peronæus Tertius.

Extensors,—Six.

Gastrocnemius,
Solæus,
Plantaris,
Tibialis Posticus,
Peronæi, Longus et Brevis.

The proper muscles of the ankle joint are materially assisted by the long extensors and flexors of the toes.

MUSCLES COMMON TO THE TOES,—SEVEN.

Flexors,—four.

Flexor Longus Digitorum,
Flexor Brevis Digitorum,
Musculus Accessorius,
Lumbricales.

Extensors,—two.

Extensor Longus Digitorum,
Extensor Brevis Digitorum.

The Interossei are both Adductors and Abductors.

MUSCLES PROPER TO THE GREAT TOE,—FIVE.

Flexors,—two.

Flexor Pollicis Longus,
Flexor Pollicis Brevis.

Extensor,—one.

Extensor Pollicis Longus.

The great toe also receives one of the divisions of the Extensor Digitorum Brevis.

Abductor Pollicis Pedis,
Adductor Pollicis Pedis.

MUSCLES PROPER TO THE LITTLE TOE,—TWO.

Abductor Minimi Digiti,
Flexor Minimi Digiti.

The little toe does not receive a fasciculus from the Extensor Digitorum Brevis.

FASCIÆ.

I am induced to give a short description of the different Fasciæ, not only on account of their importance, but because I know of no part of anatomy which students generally find more difficult to understand. This arises not so much from the abstruseness of the subject itself, as from the plan which is usually adopted in the description of these various parts, and the distinct names given to each of them, by which the student is apt to consider the fasciæ as so many separate and unconnected structures, precisely as he does so many muscles, with distinct origins and insertions; whereas, for the most part, they form portions of one continuous tissue, different names being necessary for describing and localizing each division. All fasciæ form a part of one of three series: 1st.—The Superficial Fasciæ; 2nd.—Fasciæ of a denser and more aponeurotic character, intimately connected with muscular fibre, and in a great measure derived from it, as the fascia lumborum, and those of the extremities; 3rd.—Fasciæ deeply seated, but in structure nearly resembling the superficial, as the fascia transversalis, fascia iliaca, &c.

To comprehend with clearness and accuracy the anatomical and surgical importance and relations of the various fasciæ, as well also of the numerous and most important parts with which they are connected, it is essential not to regard each portion which possesses a name as a distinct part, but to trace, as far as may be, its continuity with neighbouring fasciæ; by so doing the difficulty is much simplified, and more readily overcome.

1.—SUPERFICIAL FASCIÆ.

Under the integuments throughout the body a subcutaneous cellular tissue is found; the inner surface of this, by which it is connected to the subjacent parts, assumes more the appearance of a thin membrane than the cutaneous does. This structure, which is universal, in particular parts is considerably more distinct and evident than in others; to these portions the name of *superficial fasciæ* is given, to distinguish them from similar structures more deeply seated. This being premised, and it being always recollected that these individual portions never arise or terminate abruptly, but gradually merge in the continuous cellular tissue, they may separately be described.

Superficial Cervical Fascia.—This Fascia in some persons is weak and scarcely discernible, while in others it is very distinct and strong; it envelopes the neck immediately under the integuments, superficial to all the muscles, except the platysma myoides, which is developed within its tissue; it passes downwards over the clavicle and sternum, where it is lost in the subcutaneous membrane; above, it is attached to the ramus of the jaw and is lost upon the face, while at the side of the neck it passes backwards over the trapezius and is gradually lost.

Superficial Abdominal, Perinæal, and Femoral Fasciæ.—This is an important portion, in consequence of its relation to parts concerned in capital surgical operations. When the integuments are dissected off the anterior abdominal parietes, there is found over the whole of the external oblique muscle, a very thin fibrous covering: this, at the upper part, near the cartilages of the ribs, is indistinct and little more than cellular membrane, but as it passes downwards it becomes much stronger and more evident; it is within its structure that the superficial epigastric, circumflex ilii, and pudic vessels ramify; laterally, the superficial abdominal fascia becomes lost in the subcutaneous cellular membrane; inferiorly, in the median line in the male, it sends a process to envelope the penis and assist in forming a suspensory ligament for it; on either side, as the spermatic cord escapes from the external abdominal ring, it carries with it a prolongation of this fascia; this process envelopes the cord and passes to the scrotum, from which, after giving it a covering, it is reflected posteriorly upon the perinæum, forming the *Superficial Fascia of the Perinæum.* This perinæal portion, on either side, is attached to the rami of the pubis and ischium, and is continuous with that covering the inner side of the thigh; while posteriorly, immediately behind the transversalis perinæi muscle, it passes above the superficial sphincter ani, and joins the deep fascia of the perinæum, and with it, is lost upon the rectum and the external surface of the levator ani.

The Superficial Abdominal Fascia is then, external to the abdominal ring, intimately attached to the whole of poupart's ligament by a process which it sends to be connected with it, as the fascia itself is continued downwards on to the upper part of the thigh, where it assumes the name of *Superficial Femoral Fascia,* and becomes still thicker, so that it may be divided into several layers, between which are placed the superficial lymphatic glands; this fascia, on the outer and inner sides of the thigh, is separate and distinct from the fascia lata, but in the middle, over the vessels, it is very intimately connected with the fascia lata, and as it passes over the saphenic opening becomes almost identified with it. This part of the superficial fascia is called the *Cribriform Fascia,* on account of the numerous foramina in it for the transmission of blood vessels and lymphatics; lower on the thigh the fascia loses its character and becomes cellular.

2.—FASCIÆ INTIMATELY CONNECTED WITH, AND PRINCIPALLY DERIVED FROM, MUSCLES.

Many of these deep fasciæ are very strong, and generally present a more distinct and aponeurotic character than the superficial; for the most part they are intimately attached to the projecting processes of bones, and apparently are derived from the tendinous origins and insertions of the muscles which they cover, or assist in giving origin to.

The Ligamentum Nuchæ is scarcely to be regarded as a fascia, it consists of a band of elastic fibres, attached superiorly to the occipital protuberance, and extends inferiorly to the spinous process of the sixth or seventh cervical vertebra, forming a division between the muscles of the two sides; continuous with the inferior end of the ligamentum nuchæ is the *cervical aponeurosis*, a thin layer of fibres of an oval form, stretched between the superior angles of the two scapulæ, and extending from about the fifth cervical to the fifth dorsal vertebra.

The Fascia Lumborum is a very strong, important fascia; it may be described as consisting of three layers, which can be traced backwards from the internal oblique and transverse abdominal muscles. The inner layer assists in giving origin to the transversalis muscle; it passes anterior to the quadratus lumborum, to be attached to the bodies of the lumbar vertebræ, and is there connected with the fascia iliaca. The second layer of the fascia assists in giving origin to the internal oblique muscle; it is attached to the transverse processes of the lumbar vertebræ, posterior to the quadratus lumborum. The third portion of the lumbar fascia is by far the strongest, it gives origin to the latissimus dorsi and serratus posticus inferior, and is separated by the long lumbar muscles from the second layer; it is attached to the spinous processes of the sacrum and lumbar vertebræ, and externally to the abdominal muscles and crista ilii.

The Deep Cervical Fascia does not cover the platysma myoides or trapezius; it arises from the ligamentum nuchæ and cervical spinous processes, under the trapezius, and over the splenius and levator anguli scapulæ, which it binds down as it passes forwards to the posterior edge of the sterno-mastoideus, where it is split into two layers, to enclose this muscle and the omo-hyoideus. The anterior layer passes before the two muscles, while the posterior passes behind them over the carotid sheath, to which it is connected; at the anterior edge of the sterno-mastoideus, in the middle of the neck, the two layers join, and on the median line over the trachæa, become continuous with the fascia of the opposite side. At the lower part of the neck the superficial layer passes over the clavicle and the origin of the sterno-mastoideus, before the sternum, where it is lost upon the pectoralis major ; in the median line, the fascia is closely connected to the sternum and inter-clavicular ligament. The deep layer passes behind the clavicle and sternum, covers the subclavius muscle, and sends a process, both externally and internally, along the great vessels. As it passes from the subclavius outwards, it becomes very strong, and arches over the subclavian vessels to be connected to the coracoid process of the scapula, constituting the *costo-coracoid ligament.* The upper part of the fascia continues in two layers ; the superficial passes upwards over the parotid gland, to which it gives a dense covering, and is attached to the zygoma, and to the cartilaginous portion of the external auditory tube : the deep layer passes inwards and upwards, being attached to the styloid process of the temporal bone, and to the angle of the jaw, between the parotid and submaxillary glands, forming the *stylo-maxillary ligament.*

UPPER EXTREMITY.—The fascia of the arm forms a sheath for the muscles, and also sends processes in between them, but it is neither so strong nor so intimately connected with the muscles as that of the fore-arm. It arises from the spine and acromion of the scapula with the deltoid muscle, over which it passes; it receives a considerable accession of strength from the insertion of this muscle, as well as from the pectoralis major, latissimus dorsi, and coraco-brachialis, particularly the latter. On each side of the arm it is closely connected with the condyloid ridges, thus forming the *inter-muscular septa ;* as it passes over the condyles on to the fore-arm, it is attached to them as well as to the olecranon process; posteriorly, it is strengthened from the insertion of the triceps; anteriorly, it receives a remarkable process from the tendon of the biceps, called, from its shape, the *falciform process.* This process, which passes upwards and inwards, and is connected with the inner condyle as well as with the fascia of the fore-arm, separates the median basilic vein from the lower part of the brachial artery.

The Fascia of the fore-arm not only closely invests the muscles but sends down between them (particularly on the anterior surface) very strong inter-muscular septa, from which they in part arise; it is also connected to the edges of the radius and ulna; above it is continuous with the fascia of the arm, below it is inserted into the annular ligaments of the wrist.

The *Posterior Annular Ligament* consists of a transverse band of fibres, which passes across the extensor tendons, between the styloid processes of the radius and ulna; from its digital edge a thin broad expansion passes over the extensor tendons, and is lost upon the phalanges.

The *Anterior Annular Ligament* is a very strong, dense fibrous structure, which binds down and forms a sheath for the flexor tendons; it is attached internally, to the cuneiform bone, externally, to the scaphoid and trapezium. From it arises the very dense and strong *Palmar Fascia*, posteriorly this is narrow, and is strengthened by the insertion of the palmaris longus; it expands over the palm, becomes much broader, and divides into four fasciculi, which pass to the heads of the metacarpal bones of the four fingers, where they split to give passage to the flexor tendons, with the digital blood vessels and nerves; they are then inserted into the flexor sheaths and into the lateral ligaments of the metacarpo-phalangeal joints.

Lower Extremity.—When the integuments, cellular membrane, and superficial fascia, have been removed from the inferior extremity, it is found to be enveloped in a very strong, dense covering, the *Fascia Lata*. As is seen in the arm, the fascia lata not only covers the muscles, but in some places sends processes between them, and is also attached to the femur; it is much stronger on the anterior and outer parts of the thigh than posteriorly or internally. The fascia lata arises, behind, from the crest of the ilium, from the sacrum, and from the coccyx; internally, from the pubis and ischium; anteriorly, from the whole of poupart's ligament: as it passes downwards upon the thigh it sends a process to form a partial sheath for the sartorius, by which the muscle is retained in situ; it is also attached to the whole extent of the linea aspera and to the condyles.

The Fascia Lata consists of two sets of fibres, the circular and longitudinal, which in some places are separated, as where the tensor vaginæ is inserted between them. In the upper and fore part of the thigh this fascia is of the utmost importance, in consequence of its connection with femoral hernia. About an inch and a half below poupart's ligament is the saphenic opening, for the passage of the superficial vessels as they join the deeper. That part of the fascia which lies to the inner side of the opening is much thinner than the outer portion, and is on a plane posterior; it covers the pectineus muscle, and is called the *pubic or pectineal portion.* This arises from the ischium, from the ramus and body of the pubis, and also from the linea innominata of the latter bone, anterior to gimbernat's ligament. It passes outwards *behind* the femoral vessels to the psoas magnus, where it splits into two portions, one of which passes behind the psoas, and is connected to the capsular ligament of the hip joint; the other passes anterior to the psoas, and becomes continuous with the iliac or outer portion of the fascia lata.

The *outer* or *iliac portion* of the fascia lata, in consequence of covering the tensor vaginæ, rectus, and sartorius muscles, is on a plane anterior to the pubic portion and to the femoral vessels, over which it passes; it is attached to the superior anterior spine of the ilium, to the whole of poupart's ligament down to the spine of the pubis, and also to gimbernat's ligament; from it thus stretching over the femoral vessels, it necessarily forms a crescentic fold, the lower limb of this is joined with the pubic portion of the fascia to constitute the lower margin of the saphenic opening; the upper limb joins with gimbernat's ligament, so that the concavity looks downwards and inwards, forming the falciform process of the fascia lata. The fascia, at the margin of the saphenic opening, does not terminate abruptly as at first sight appears, but is reflected downwards upon the sheath of the artery and vein, thus completely preventing any thing passing from above through the saphenic opening down upon the sheath; this is readily seen by dividing the fascia transversely two inches below the opening, and carefully raising it, when the reflected layer will be very evident.

At the lower part of the limb the fascia lata is strengthened by its connection with the origin of the short head of the biceps; it is stretched across the popliteal space, and is attached to the condyles of the femur, and to the heads of the tibia and fibula; from the muscles inserted into these points it receives an addition of fibres. It closely envelopes the muscles on the anterior and outer part of the leg, sends intermuscular septa between them, and is connected to the spines of the tibia and fibula as far as the anterior annular ligament. On the posterior surface of the leg there are two layers of this fascia; the superficial is weak, and is external to the gastrocnemius muscle; the deeper is placed between the deep and superficial muscles, and is stronger than the superficial portion, receiving an aponeurotic expansion from the semi-membranosus muscle; at the lower part of the leg, on each side of the tendo achilles, these two layers join, and are inserted into the malleolar processes, into the sheath of the peronæi muscles, and into the internal annular ligament.

The *Anterior Annular Ligament,* which is attached to the outer malleolus and calcis, passes over, and forms sheaths for, the extensor tendons, and is there connected with the inner malleolus. The *Inner Annular Ligament* is attached to the inner malleolus, and sheath of the flexor tendons, and passes to be connected with the tuberosity of the calcis. From the anterior annular ligament a thin aponeurotic expansion passes over the dorsum of the foot; this, in the middle, is attached to the phalanges; on the inner side, to the margin of the plantar fascia; and on the outer, to the fifth metatarsal bone, and to the outer margin of the plantar fascia.

The *Plantar Fascia* is an exceedingly strong, dense layer of longitudinal fibres, interwoven with transverse, it extends from the tubercles of the os calcis to the phalanges of the toes; at its origin it is narrow, but as it passes forwards it expands and divides into three portions, which are not only upon different planes, but separated from each other by two inter-muscular septa. The internal division, which covers the abductor pollicis, is much thinner than the middle portion, and is connected to the tarsal and metatarsal bones; it joins with the inner edge of the dorsal fascia. The outer division of the plantar fascia is narrow, it covers the abductor minimi digiti, and is firmly connected to the fifth metatarsal bone; it also joins with the outer edge of the dorsal fascia. The middle division of the plantar fascia is the strongest; it lies on a plane lower than the other two portions, and passes forwards under the flexor brevis digitorum; as it advances towards the heads of the metatarsal bones, it divides into five fasciculi, which split to give passage to the flexor tendons, digital vessels, and nerves; they are inserted into the lateral ligaments of the metatarso-phalangeal joints, and into the flexor sheaths.

3.—DEEP FASCIÆ.

Fascia Transversalis, Fascia Iliaca, Fascia Pelvica, Fascia Obturatoria, and Fascia Profunda Perinæi.

These various names are given to different portions of one continuous structure; it is, however, necessary to apply distinctive names in order to describe and distinguish them. The *Fasciæ Trans-*

versalis and Iliaca are found investing the exterior surface of the peritoneum, the one under the transversalis muscle, the other above the psoas and iliacus muscles. When the transversalis muscle is removed, the peritoneum, at the upper part of the abdomen, is found to be covered by a thin cellular tissue, which as we proceed downwards, gradually becomes stronger and denser, though still very thin; if traced, it is seen to be attached to the crista of the ilium, to the whole of poupart's ligament, and behind the rectus to be continuous with that of the opposite side. About midway between the superior anterior spine of the ilium and the symphysis of the pubis, and rather less than an inch above poupart's ligament, the vas deferens and spermatic vessels meet on their passage through the inguinal canal; at this point they pass through a fissure in the fibres of the fascia transversalis, carrying a prolongation of it with them, (the *fascia spermatica interna* of anatomists, *fascia propria* of inguinal hernia of surgeons), by which this opening is rendered indistinct, and unlike a ring, as its common name implies, (internal abdominal ring).

If the *Fascia Transversalis* be divided across the lower part of the abdomen, carefully dissected down, and the peritoneum then pushed upwards, it will be seen that this fascia does not terminate abruptly at its attachments. In the median line, behind the recti muscles, it continues downwards, posterior to the symphysis pubis, where we shall afterwards trace it.

On the outer side of the spine of the pubis, from gimbernat's ligament to the femoral artery, it passes under poupart's ligament into the thigh, forming the anterior part of the sheath of the femoral vessels. From the remainder of poupart's ligament, and from the crista of the ilium, the fascia is reflected upwards and inwards, towards the brim of the pelvis, behind the peritoneum and over the iliacus internus and psoas muscles, it is here called the *Fascia Iliaca*. This Fascia is on a plane posterior to the external iliac artery and vein; as these vessels pass under poupart's ligament into the thigh it sends a process behind them to form the posterior part of the sheath, in the same manner, and to the same extent, as the fascia transversalis does in front, by which the sheath is completed. This sheath is of a funnel shape, the base above, the apex below, it is straight on the outer side, and is in contact with the artery; on the inner side, the vein being at some little distance from the base of gimbernat's ligament, which forms the inner boundary of the sheath, it is oblique, and gradually becomes narrower in the upper part of the thigh, where the reflected portion of the margin of the saphenic opening is lost upon it.

Upwards the iliac fascia is continued upon the psoas muscle anterior to the quadratus lumborum, where it merges with the inner layer of the fascia lumborum, and is lost upon the crura of the diaphragm. Internally the iliac fascia passes to the brim of the pelvis, and at the fore part, on the inner side of gimbernat's ligament, it becomes continuous with that portion of the fascia transversalis which passes behind the symphysis pubis; it now loses the name of fascia iliaca and is called the pelvic fascia. The *Pelvic Fascia* proceeds from the brim of the pelvis to the upper edge of the levator ani muscle, where it divides into two layers, one of which passes internal to this muscle, the other external. The internal layer proceeds on the surface of the levator ani, between it and the peritoneum, to a line drawn from the lower edge of the symphysis pubis to the spine of the ischium, forming the *Vesical Fascia*; it is then reflected upon the bladder, on the muscular coat of which it is lost; anteriorly, as it passes over the upper part of the prostrate gland, it forms the anterior true ligament of the bladder, (the false being the reflection of the peritoneum); laterally, as it is reflected upon the side of the bladder, it forms the true lateral ligament; posteriorly, it is lost upon the sides of the rectum.

The external layer of the pelvic fascia passes between the outer surface of the levator ani and the obturator internus muscles, to which it closely adheres; this constitutes the *Obturator Fascia.* Inferiorly, the obturator fascia is attached to the tuber ischii, to the rami of the ischium and pubis, and also to the falciform process of the greater sciatic ligament, from which it receives an increase of strength; it is then continued across the perinæum, to join with the opposite fascia, constituting the deep fascia of the perinæum, or the triangular ligament of the urethra.

The *Deep Fascia of the Perinæum* is of a triangular form; the apex, thin and weak, is under the symphysis pubis, with the ligaments of which it is connected; the base of it is towards the rectum, at the central point of the perinæum it is joined by the superficial fascia, and becoming cellular, is lost upon the outer surface of the levator ani and upon the rectum; laterally, it is attached to the rami of the ischium and pubis. This fascia is very strong and consists of two layers, between which, at the base of it, the artery of the bulb runs to the urethra. The fascia gives passage to the urethra, and in so doing its two layers divide and separate; the anterior envelopes the bulb with a strong covering and retains it in situ, the posterior layer is continued backwards upon the membranous part of the urethra to the prostrate gland, to which it gives a capsule, and is lost at the neck of the bladder.

BLOOD VESSELS.

ARTERIES.

The heart is the centre of the circulatory system, since from it the arteries commence, and at it the veins terminate. It is placed in an oblique position, to the left of the median line. The base is backwards, upwards, and towards the right side, nearly opposite to the fourth dorsal vertebra; the apex, which is downwards, forwards, and towards the left, corresponds to the intercostal space between the fifth and sixth ribs. Of the eight vessels connected with the heart, six are veins, and two are arteries: of these, five—the pulmonary artery, and the four pulmonary veins, belong to the lesser or pulmonic circulation; three—the aorta and two venæ cavæ, to the larger or systematic circulation. Three vessels, besides the small cardiac vein, are connected with the right side of the heart, the two cavæ open into the auricle; the pulmonary artery arises from the ventricle. With the left side, five vessels are connected, the four pulmonary veins open into the auricle; the aorta arises from the ventricle. The right or anterior side of the heart contains dark or venous blood, the left florid or arterial.

PULMONARY CIRCULATION.

The pulmonary artery conveys the venous blood from the heart to the lungs ; it arises from the right ventricle, immediately in front of the aorta, on a level with the cartilage of the fourth rib of the left side at its junction with the sternum ; it also corresponds with the body of the fourth dorsal vertebra. It forms a large short trunk, about two inches and a half long ; passing backwards and to the left, it divides into the right and left pulmonary arteries, of which the right is the longer and larger : this divides into three branches, the left divides into two only, corresponding with the lobes of the respective lungs. Each artery afterwards divides into an infinity of branches, from which the pulmonary veins arise ; these are two on each side, they are placed before and somewhat below the corresponding artery, which is between the vein and the bronchial tube, the latter being above and behind the artery, while the veins are below and before.

SYSTEMATIC CIRCULATION.

The aorta arises from the highest part of the right side of the left ventricle, immediately behind the pulmonary artery, consequently opposite to the junction of the cartilage of the left fourth rib with the sternum, and also to the left of the body of the fourth dorsal vertebra; at first the aorta is placed between the pulmonary artery and the vena cava descendens, the former being before and to the left, the latter behind and to the right; like the roots of all the other vessels it is at first covered by the pericardium. It passes forwards, upwards, and to the right, as high as the cartilage of the second rib upon the right side; it then curves to the left and passes transversely across the upper part of the thorax, lying upon the lower part of the trachæa, to the left side of the body of the second dorsal vertebra; it then proceeds downwards through the thorax, enters the abdomen between the crura of the diaphragm, and at the lower edge of the fourth lumbar vertebra, it divides into the two common iliacs.

From its origin to the third dorsal vertebra, it is called the Arch of the Aorta; from thence to the twelfth dorsal vertebra, the Thoracic Aorta; and through the remainder of its course, the Abdominal.

ARCH OF THE AORTA.

This is divided into three portions, the ascending, transverse, and descending.

The ascending extends from the origin of the aorta to the cartilage of the second right rib, it is the most dilated portion of the aorta; it is directly behind the sternum and between the pulmonary artery and descending cava; from it arise two branches only, the right and left coronary, which supply the heart. These are given off from two of the small pouches, or sinuses of morgagni, immediately above the semilunar valves.

The **Right or Anterior Coronary Artery** appears between the pulmonary artery and right auricular appendix; it runs in the depression between the auricle and ventricle, and divides into three branches: the *Superior, Inferior, and Posterior.*

The **Left or Posterior Coronary Artery** is the smaller, it appears between the pulmonary artery and left auricular appendix, and divides into two branches, the *Superior and Inferior.*

The transverse portion of the arch extends from the cartilage of the second right rib to the second dorsal vertebra; it lies upon the lowest part of the trachæa, and is somewhat overlapped by the left vena innominata; it gives off three branches which supply the head, neck, and upper extremities.

1. Arteria Innominata,
2. Arteria Carotis Communis Sinistra,
3. Arteria Subclavia Sinistra.

The left recurrent laryngeal nerve and the ligamentous remains of the ductus arteriosus, mark the separation between the transverse and the descending parts of the arch; the latter extends from the second dorsal vertebra to the lower edge of the third, it has the œsophagus and thoracic duct to the right of it. From it no branches are usually given off.

ARTERIA INNOMINATA.

This is a short large trunk, from an inch to an inch and a half in length, it passes towards the right side and upwards, as far as the right sterno-clavicular articulation; it lies upon the trachæa, and is covered by the sterno-mastoid, hyoid, and thyroid muscles, by the upper bone of the sternum, and by the vena innominata; it divides into two branches.

1. Arteria Carotis Communis Dextra,
2. Arteria Subclavia Dextra.

COMMON CAROTID.

The two common carotid arteries differ from each other at their origin, in other respects they are similar. The right, arising from the innominata opposite to the sterno-clavicular articulation, is not within the chest. The left, arising from the arch of the aorta, is at first within the thorax, and is covered by the sternum, the left vena innominata, and the remains of the thymus gland; it lies upon the trachæa, the æsophagus, and the thoracic duct. The carotids pass up to the space between the cornu of the os hyoides and thyroid cartilage, or to about the third cervical vertebra, where they divide into the external and internal carotids. In this course no branches are usually given off by them. The artery is enclosed in a sheath with the jugular vein and par vagum nerve, the vein lies to the outer side, the nerve between and posterior to the artery and vein. The sheath of the vessel lies upon the cervical vertebræ, the rectus capitis anticus major and longus colli muscles, the sympathetic and recurrent nerves, and the inferior thyroid artery; it is covered by the integuments, the platysma myoides, sterno-mastoid, hyoid, thyroid, and omo-hyoid muscles, with the cervical fasciæ. The descendens noni passes down upon the sheath; above this nerve lies on its outer side, below on its inner.

EXTERNAL CAROTID.

This is more superficial and rather smaller than the internal carotid artery. It passes upwards, at first inclining inwards and then backwards, into the substance of the parotid gland; where, mid-way between the angle of the jaw and zygomatic process, it divides into the temporal and internal maxillary arteries.

The external carotid is covered by the integuments, the platysma, the cervical fasciæ, the lingual nerve, the digastric and stylo-hyoid muscles, and near its termination by the portia dura. It lies upon the pharyngeal plexus and glosso-pharyngeal nerves, the stylo-glossus and stylo-pharyngeus muscles, and upon part of the parotid gland, by all which parts it is also separated from the internal carotid artery.

The branches of the external carotid are nine in number; they are divided into three sets; each set contains three branches.

1. *Anterior Set.*

Arteria Thyroidea Superior,
Arteria Lingualis,
Arteria Facialis vel Labialis.

2. *External Set.*

Arteria Muscularis vel Sterno-mastoidea,
Arteria Occipitalis,
Arteria Posterior Auris.

3. *Ascending Set.*

Arteria Pharyngea Ascendens,
Arteria Temporalis Superficialis,
Arteria Maxillaris Interna.

The transverse facial is frequently classed as one of the ascending branches of the external carotid, making the tenth branch, but as it is as often given off by the temporal, I prefer the above enumeration as quite correct, and more easily recollected.

The Anterior set of Branches are considerable trunks.

1.

The Superior Thyroideal Artery gives off four branches.

1. Ramus Hyoideus,
2. Ramus Superficialis,
3. Ramus Laryngeus,
4. Ramus Thyroideus.

2.

The Lingual Artery gives off four branches.

1. Ramus Hyoideus,
2. Arteria Dorsalis Linguæ,
3. Arteria Sublingualis,
4. Arteria Ranina.

3.

The Facial Artery gives off ten branches; four before it passes over the lower jaw, six afterwards.

1. Arteria Palatina Inferior,
2. Arteria Tonsillaris,
3. Arteriæ Glandulares,
4. Arteria Submentalis,

Given off before it has passed over the ramus of the lower jaw.

5. Arteria Labialis Inferior,
6. Arteria Coronaria Inferior,
7. Arteria Coronaria Superior,
8. Arteriæ Massetericæ,
9. Arteria Nasi Lateralis,
10. Arteria Angularis,

Given off after it has passed the lower jaw.

External set of Branches.

1. Arteria Sterno-mastoidea,
2. Arteria Occipitalis,
3. Arteria Posterior Auris.

The branches of these three vessels, though numerous, particularly those of the two latter, are small and have not received names.

Ascending set of Branches.

1.

The Ascending Pharyngeal Artery is small, and gives off no branches of importance.

2.

The Temporal Artery gives off six branches.

1. Arteria Transversalis Faciei,
2. Arteriæ Anteriores Auris,
3. Arteriæ Capsulares,
4, 5, and 6. Arteriæ Temporales, Media, Posterior, et Anterior.

3.

The Internal Maxillary Artery gives off eleven branches, which are arranged into three sets; —1st. Those given off while the artery is behind the lower jaw; 2nd. Those given off while it is between the pterygoid muscles; 3rd. Those given off in the spheno-maxillary fossa.

1st Set contains two.

1. Arteria Meningea Media,
2. Arteria Dentalis Inferior.

2nd Set contains four.

1. Arteriæ Pterygoideæ,
2. Arteriæ Temporales Profundæ,
3. Arteriæ Massetericæ,
4. Arteriæ Buccales.

3rd Set contains five.

1. Arteria Dentalis Superior,
2. Arteria Palatina Descendens,

3. Arteria Nasalis,
4. Arteria Vidiana,
5. Arteria Infra-orbitalis.

The inferior dental of the first set, and all the branches of the second set, are accompanied by twigs of the third division of the fifth pair of nerves, while, in like manner, all the third set are accompanied by branches of the second division of the same nerve.

INTERNAL CAROTID.

This vessel continues its course onwards to the base of the cranium, into which it enters by the foramen caroticum, it passes through the tortuous canal in the petrous portion of the temporal bone, and traverses the cavernous sinus by the side of the sella turcica, as far as the anterior clinoid process, where it pierces the dura mater.

While in the neck, it lies upon the rectus anticus major muscle, the par vagum nerve, and the superior ganglion of the sympathetic; to its outer side is the internal jugular vein, to its inner the ascending pharyngeal artery and the pharynx.

In addition to the parts which cover the external carotid, the branches of the latter also lie upon the internal; these, together with the parts which separate the two carotids, have already been mentioned, (vide external carotid, p. 150.)

In the neck the internal carotid does not usually give off any branches; in the temporal bone it only gives twigs to the tympanum. The relative position of the parts within the cavernous sinus is as follows: —the artery lies next the sella turcica, the venous blood to the outer side of this, the third pair of nerves above, the fourth next, then the first division of the fifth, lastly the sixth; while in the sinus it gives off small branches, called the Arteriæ Receptaculi. As it leaves the sinus, and after it has pierced the dura mater, it has the optic nerve to its inner side, and the motor oculi to its outer.

Four branches are derived from the internal carotid.

1. ARTERIA OPHTHALMICA,
2. ARTERIA COMMUNICANS POSTERIOR,
3. ARTERIA CEREBRI MEDIA,
4. ARTERIA CEREBRI ANTERIOR.

1.

THE OPHTHALMIC ARTERY, having entered the orbit through the foramen opticum with the optic nerve, gives off eleven branches, which are divided into—1st. Those which are given off on the outer side of the optic nerve; 2nd. Those given off above the nerve; 3rd. Those given off on the inner side of the nerve.

Those given off on the outer side of the nerve.

1. Arteria Lachrymalis,
2. Arteria Centralis Retinæ.

Those given off above the nerve.

1. Arteria Supra-orbitalis,
2. Arteriæ Ciliares,
3. Rami Musculares.

Those given off while on the inner side of the nerve.

1. and 2. Arteriæ Ethmoidales, Anterior et Posterior,
3. and 4. Arteriæ Palpebrales, Superior et Inferior,
5. Arteria Nasalis,
6. Arteria Frontalis.

2.

The Posterior Communicating Artery is a short vessel which passes backwards, on the outer side of the infundibulum and the mammillary bodies, to join with the posterior cerebral artery, which is a branch of the basilar.

3.

The Middle Cerebral Artery is the largest of these vessels, it runs backwards and upwards, in the fissura sylvii.

4.

THE ANTERIOR CEREBRAL ARTERY passes inwards and forwards, above the optic, and beneath the olfactory nerve, to the commencement of the longitudinal fissure of the cerebrum; where it joins with its fellow of the opposite side by a short branch called the anterior communicating artery, by which the circle of Willis is completed. The anterior artery then winds round the corpus callosum, and divides into branches which are distributed upon the commutual region of the hemispheres.

SUBCLAVIAN ARTERY.

This artery supplies the whole of the upper extremity with blood. From its origin to the lower edge of the first rib, it retains the name of subclavian; from thence, to the inferior edge of the tendons of the teres major and latissimus dorsi, it is called the axillary artery; from this point to the bend of the elbow, where it divides into the radial and ulnar to supply the fore-arm and hand, it is named the brachial artery.

The right subclavian artery is much shorter than the left, in consequence of its rising from innominata opposite to the sterno-clavicular articulation, while the left subclavian arises from the arch of the aorta, opposite to the second dorsal vertebra.

The right subclavian passes upwards and outwards, behind the scalenus anticus muscle, then bending downwards, it passes over the first rib, under the clavicle and subclavius muscle, into the axillary space; in this course the vessel forms a convexity which looks upwards, a concavity which looks downwards and embraces the apex of the pleura, upon which it lies. The course of the subclavian artery is usually divided into three stages—1st. Between its origin and the inner edge of the scalenus anticus muscle; 2nd. While behind the scalenus; 3rd. From the outer side of the scalenus to the edge of the first rib.

In its first stage it has behind it, the sympathetic and the recurrent laryngeal nerves, some lymphatic glands, and the longus colli muscle. It is covered by the sterno-mastoid, hyoid, and thyroid muscles, the par vagum, and some branches of the sympathetic nerves, the internal jugular and vertebral veins, and by a strong fascia, which extends from the arteria innominata to the scalenus anticus,—a continuation of the deep cervical fascia. In the second stage it lies upon the pleura and middle scalenus, and is covered by the platysma, the cervical fasciæ, the clavicular portion of the sterno-mastoideus, and the scalenus anticus muscles, the last of these separates the artery from the subclavian vein and the phrenic nerve. In its third stage it lies upon the middle scalenus and first rib, and is covered by the platysma myoides, both cervical fasciæ, some cellular membrane, and glands; it has the brachial plexus of nerves and the omo-hyoideus above and to its external side, and the subclavian vein below and anterior to it.

As the left subclavian arises from the aorta, its first stage is longer than that of the right, it is covered by the lung and the left vena innominata, and is connected with the thoracic duct and æsophagus; in the second and third stages the opposite arteries are precisely similar. The branches of the subclavian are very irregular in number and origin; there are, however, most commonly five branches; of which, three are given off in its first stage, two in its second.

Given off in its first stage.

1. ARTERIA VERTEBRALIS,
2. AXIS THYROIDEUS,
3. ARTERIA MAMMARIA INTERNA.

Given off in its second stage.

4. ARTERIA INTERCOSTALIS SUPERIOR,
5. ARTERIA CERVICALIS PROFUNDA.

1.

THE VERTEBRAL ARTERY enters the foramen in the transverse process of the sixth cervical vertebra, between the longus colli and the scaleni muscles; it passes through the successive transverse foramina, and having entered the cranium, through the posterior broad ligament, it gives off three branches.

1. and 2. Arteriæ Medullæ Spinalis, Anterior et Posterior,
3. Arteria Cerebelli Inferior vel Posterior.

Having given off these branches, the two vertebral trunks converge, and unite upon the basilar process of the occipital bone, to form the Arteria Basilaris. This is a short trunk, near an inch and a half in length, and runs in a groove on the under surface of the pons varolii; from it, on each side, three branches are given off.

1. Arteria Labyrinthi,
2. Arteria Cerebelli Superior vel Anterior,
3. Arteria Cerebri Posterior.

2.

The Thyroid Axis is a large short trunk, which immediately divides into four branches; two of these ascend, the other two pass outwards in a transverse direction.

Ascending Branches.

1. Arteria Thyroidea Inferior vel Ascendens,
2. Arteria Cervicalis Ascendens.

These do not give off branches which have received names.

Transverse Branches.

3. Arteria Transversalis Humeri, vel Supra-scapularis, which gives off three branches.

1. *Arteria Acromialis Superior,*
2. *Arteria Supra-spinalis,*
3. *Arteria Infra-spinalis.*

4. Arteria Transversalis Colli, which divides into two branches.

1. *Arteria Superficialis Colli,*
2. *Arteria Scapularis Posterior.*

3.

The Internal Mammary Artery passes into the thorax with the phrenic nerve; it gives off five branches.

1. Arteria Intercostales Anteriores, (five),
2. Arteriæ Mediastini,
3. Arteria Comes Nervi Phrenici,
4. Ramus Abdominalis,
5. Arteria Musculo-phrenica.

4.

The Superior Intercostal Artery, on the left side, generally gives off two branches, on the right side, three, which supply the same number of superior intercostal spaces.

5.

The Deep Cervical Artery passes between the branches of the brachial plexus of nerves, and escapes between the sixth and seventh cervical transverse processes, to mount upwards upon the arches of the cervical vertebræ; it does not give any branches which have received names.

AXILLARY ARTERY.

This vessel in the middle of its course is closely connected with the axillary plexus of nerves: it lies upon the first layer of intercostal muscles, the serratus magnus, the sub-scapularis, and the tendons of the latissimus dorsi and teres major muscles. It is covered by the integuments, the pectorales (major et minor) muscles, and the costo-coracoid ligament. It gives off seven branches.

1. Arteria Thoracica Acromialis vel Humeraria,
2. Arteria Thoracica Suprema,
3. Arteria Longa vel Mammaria Externa,
4. Arteria Alaris,
5. Arteria Sub-scapularis,
6. and 7. Arteriæ Circumflexæ, Posterior et Anterior.

The only one of these vessels, the subdivisions of which have received names, is the Sub-scapularis; this divides into two branches.

1. *and* 2. *Ramus Anterior and Ramus Posterior.*

HUMERAL, OR BRACHIAL ARTERY.

From the lower edge of the tendons of the latissimus dorsi and teres major to its division in the bend of the elbow into the radial and ulnar, the artery takes the name of brachial. In this course the artery rests upon the short head of the triceps, and upon the insertion of the coraco-brachialis and the brachialis anticus muscles. It is covered by the integuments, the fascia, the coraco-brachialis, and the biceps; numerous branches are given off, only four of which are commonly distinguished by names.

1. Arteria Profunda Superior,
2. Arteria Nutritia Humeri,
3. Arteria Profunda Inferior,
4. Arteria Anastomotica Magna.

ULNAR ARTERY.

This is the larger of the two branches into which the brachial artery divides; it lies upon the insertion of the brachialis anticus, the flexor digitorum profundus, the annular ligament, and in the hand upon the tendons of the flexor muscles; it is covered by the integuments, the fascia of the fore-arm and hand, the pronator radii teres, the flexor carpi radialis, the palmaris longus, and the flexor sublimis. It gives off seven branches.

1. Arteria Recurrens Anterior,
2. Arteria Recurrens Posterior,
3. Arteria Interossea,
4. and 5. Arteriæ Carpi Ulnares, Anterior et Posterior,
6. Arteria Profunda vel Communicans,
7. Arteria Palmaris Superficialis.

The Interosseous artery divides into three branches, *Arteriæ Interosseæ, Anterior, Posterior, et Recurrens.*

The superficial palmar branch, by receiving the volar artery from the radial, forms the *Superficial Palmar Arch;* this gives off *four digital branches* to supply the inner side of the first, and the whole of the second, third, and fourth fingers.

RADIAL ARTERY.

The Radial Artery is smaller and more superficial than the ulnar, it passes from the bend of the elbow to the cleft, on the dorsum of the hand, between the thumb and first finger. It lies upon the insertion of the biceps, the pronator teres, the supinator brevis, the flexor digitorum sublimis, the flexor pollicis longus, and the pronator quadratus muscles. It is covered by the integuments and fascia throughout its course; near its origin it is overlapped by the supinator longus, and near the end of the radius, the tendons of three extensors of the thumb cross over it. It gives off nine branches which have received names.

1. Arteria Radialis Recurrens,
2. Arteria Superficialis Volæ,
3. and 4. Arteriæ Carpi Radiales, Anterior et Posterior,
5. and 6. Arteriæ Dorsales Pollicis, (Radialis et Ulnaris),
7. Arteria Princeps vel Magna Pollicis,
8. Arteria Indicis,
9. Arteria Palmaris Profunda.

DESCENDING AORTA.

THORACIC AORTA.

That part of the aorta which extends from the fourth to the twelfth dorsal vertebra, and which is contained within the posterior mediastinum, is called the Aorta Thoracica; at the upper part, it is to the left of the vertebræ, but at the lower, where it passes between the crura of the diaphragm, it lies in the median line. To the right of the artery are placed the thoracic duct and the vena azygos; and before it, the left bronchial tube, the root of the left lung, the æsophagus, and the pericardium with the base of the heart.

The branches of the thoracic aorta, though numerous are not large; they may be divided into two sets, a posterior or parietal, and an anterior or visceral.

The Posterior Set are the

ARTERIÆ INTERCOSTALES INFERIORES; of which there are generally nine on the right side, and ten upon the left.

The Anterior Set are the

1. ARTERIÆ BRONCHIALES, which are generally four in number;
2. ARTERIÆ ÆSOPHAGEALES: these are very uncertain in number, and vary from one to six.

ABDOMINAL AORTA.

The opening between the crura of the diaphragm is considerably larger than the aorta itself, so that no compression can take place; the thoracic duct and the vena azygos pass into the thorax, through the same opening, on the right side of the artery. The aorta continues upon the bodies of the lumbar vertebræ, behind the peritoneum, as low as the inferior edge of the fourth, where it divides into the two common iliacs. The branches of the abdominal aorta are twenty-two in number, and may be divided into three sets.

1st Set.—Those which supply the Chylopoietic Viscera.

1. Arteria Cœliaca,
2. Arteria Mesenterica Superior,
3. Arteria Mesenterica Inferior.

2nd Set.—Those which supply the other Viscera.

1. Arteriæ Capsulares, (dextra et sinistra),
2. Arteriæ Renales, (dextra et sinistra),
3. Arteriæ Spermaticæ, (dextra et sinistra).

3rd Set.—Those which supply the Parietes.

1. Arteriæ Phenicæ, (dextra et sinistra),
2. Arteriæ Lumbales, (dextræ et sinistræ),
3. Arteria Sacra Media.

These branches arise from the aorta in the following order:—

1. The Phrenic Arteries, (two),
2. The Cœliac Axis,
3. Superior Mesenteric Artery,

4. Capsular Arteries, (two),
5. Renal Arteries, (two),
6. The Spermatic Arteries, (two),
7. The Inferior Mesenteric Artery,
8. The Lumbar Arteries, (five pairs),
9. The Middle Sacral Artery.

Of these branches of the abdominal aorta it is only necessary to notice the subdivisions of the three large vessels which supply the chylopoietic viscera.

1.

Cœliac Axis.

This short trunk immediately divides into three large vessels.

(1.)

The Arteria Gastrica, vel Conoraria Ventriculi, which has two branches.

1. Ramus Superior, this passes towards the cardiac orifice of the stomach;
2. Ramus Inferior, which passes along the lesser curvature of the stomach to the pylorus.

(2.)

Arteria Hepatica, which has four branches.

1. Arteria Pylorica Superior,
2. Arteria Gastro-duodenalis, which subdivides into the *Pancreatica-duodenalis* and the *Gastro-epiploica Dextra,*

3. Arteria Hepatica Sinistra,
4. Arteria Hepatica Dextra, which gives off the *Arteria Cystica.*

(3.)

The Arteria Splenica, which has five branches.

1. Arteriæ Pancreaticæ Parvæ,
2. Arteriæ Pancreatica Magna,
3. Vasa Brevia, (five or six small vessels),
4. Arteriæ Splenicæ, (from four to six large vessels),
5. Arteria Gastro-epiploica Sinistra.

2.

The Superior Mesenteric Artery gives off

1. Arteria Colica Media,
2. Arteria Colica Dextra,
3. Arteria Ilio-colica,

Given off from its concave side to the large intestine.

4. Fifteen or twenty branches from its convex side to the small intestines.

3.

The Inferior Mesenteric Artery.

1. Arteria Colica Sinistra,
2. Arteria Sigmoidea,
3. Arteria Hæmorrhoidalis Superior vel Interna.

COMMON ILIAC ARTERY.

The two common iliac arteries extend from the lower edge of the fourth lumbar vertebra to the sacro-iliac synchondrosis. They are short large trunks, and seldom give off any branches; that on the right side is rather the longer, and passes over the termination of the left iliac vein and the commencement of the vena cava ascendens. They are behind the peritoneum, and consequently posterior to all the viscera; they divide into two large branches.

1. Arteria Iliaca Interna vel Hypogastrica,
2. Arteria Iliaca Externa.

INTERNAL ILIAC ARTERY.

This short branch extends from the sacro-iliac synchondrosis to the sacral notch; the accompanying vein is posterior to the artery, and the pyriformis muscle and sacral plexus of nerves internal to it. The ureter passes anterior to it at its commencement, and the vas deferens at its ligamentous termination upon the bladder. The branches of the internal iliac are exceedingly irregular in number and origin; in the male they are usually enumerated as nine, in the female as eleven; they may be divided into two sets, one which supplies the parts within the pelvis, the other those without. The second are by far the larger branches.

1. *Those which supply the parts within the Pelvis.*

1. Arteria Ilio-lumbalis, 2. Arteria Hæmorrhoidalis Media, 3. Arteria Sacri Lateralis, 4. Arteriæ Vesicales, 5. Arteria Umbilicalis,	In the male.
6. Arteria Uterina, 7. Arteria Vaginalis,	In the female.

2. *Those which pass out of the Pelvis.*

1. Arteria Obturatoria vel Thyroidea,
2. Arteria Glutea vel Iliaca Posterior,
3. Arteria Ischiadica,
4. Arteria Pudica Interna, vel Pudenda Circumflexa.

It is not necessary to enumerate the subdivisions of the first set, as, with the exception of the ilio-lumbar, they are irregular and small. The ilio-lumbar divides into three sets of branches:—1st. *Ascending,* to join the lumbar arteries; 2nd. *Descending,* to join the circumflex ilii; 3rd. *Transverse,* to join the glutæal.

The branches of the second set are larger and more important.

1.

The OBTURATOR ARTERY gives off within the pelvis several small branches, and having escaped through the foramen of the same name, divides into an *Anterior* or *Internal,* and into a *Posterior* or *External Branch.*

2.

The GLUTEAL ARTERY is the largest branch of the internal iliac, it escapes through the upper part of the gluteal notch accompanied by the superior gluteal nerve, and divides into a *smaller or Superficial Branch, and a larger or Deep Branch,* which again, but particularly the latter, subdivide into many branches to supply the glutæi muscles.

3.

The ISCHIADIC ARTERY escapes from the pelvis with the pudic, between the pyriformis and the levator ani muscles; it divides into three branches.

1. Arteria Coccygea,
2. Arteria Comes Nevi Ischiadici,
3. Rami Musculares.

4.

The INTERNAL PUDIC ARTERY escapes with the ischiadic through the lower part of the great sciatic notch, and again re-enters the pelvis through the smaller, as the obturator is passing out; this latter part of its course extends from the spinous process of the ischium to the arch of the pubis, and is by far the most important portion of the artery, it is only from this part of it that the branches which it gives off have received names; they are seven in number.

1. Arteriæ Hæmorrhoidales Externæ,
2. Arteria Perinæi.Superficialis,
3. Arteria Perinæi Transversa,
4. Arteria Profunda vel Corporis Bulbosi,
5. Arteria Corporis Cavernosi Penis,
6. Arteria Dorsalis Penis.

EXTERNAL ILIAC ARTERY.

In the adult this artery is in size and course the continuation of the common iliac, it passes downwards, behind the peritoneum, on the inner edge of the psoas muscle as far as poupart's ligament, where it takes the name of femoralis communis; the vein lies to its inner side. It is covered by the peritoneum. The branches of this trunk are small and few, only two have received names.

1. Arteria Epigastrica,
2. Arteria Circumflexa Ilii.

FEMORAL ARTERY.

The Femoral Artery extends from poupart's ligament to the opening in the abductor tendon at the lower part of the thigh. It lies upon the psoas magnus and abductor longus, being separated by small vessels and cellular membrane from the pectineus and abductor brevis. It is covered by the integuments and fascia, the sartorius, and the vastus internus muscles. It gives off five branches.

Given off in the upper part of the Thigh.

1. Arteria Epigastrica Superficialis,
2. Arteria Circumflexa Ilii Superficialis,
3. Arteriæ Pudendæ Externæ,
4. Arteria Profunda Femoralis.

Given off as it passes through the Abductor Tendon.

5. Arteria Anastomotica Magna.

The Profunda. The only one of these branches which is large is the profunda, this is a very important trunk, the subdivisions of it principally supply the thigh with blood; they are five in number.

1. Arteria Circumflexa Externa,
2. Arteria Circumflexa Interna,

3, 4, and 5. Arteriæ Perforantes, Prima, Secunda, et Tertia.

POPLITEAL ARTERY.

This is the continuation of the femoral; it extends from the tendinous opening of the triceps to the lower edge of the popliteus muscle, where it divides into the anterior and posterior tibial. The artery is accompanied by the vein and nerve, both of which are external and superficial. It lies upon the femur, the posterior ligament of the knee joint, and the popliteus muscle ; it is covered by the integuments, fascia, glands, and adipose membrane, the semi-membranosus and gastrocnemius muscles: it gives off seven branches.

1. Rami Musculares Superiores,
2. and 3. Arteriæ Articulares Superiores, Interna et Externa,
4. Arteria Articularis Media vel Azygos,
5. and 6. Arteriæ Articulares Inferiores, Externa et Interna,
7. Rami Musculares Inferiores, vel Surales.

ANTERIOR TIBIAL ARTERY.

The anterior is smaller than the posterior tibial artery ; it immediately passes through the interosseous ligament, and lies between the tibialis anticus and the extensor longus muscles, then between the former and the extensor pollicis ; it passes over the lower end of the tibia, and under the annular ligament with the extensor tendons, to the space between the metatarsal bones of the first and second toes ; it gives off eight branches.

1. Arteria Recurrens Tibialis,

2. Rami Musculares,
3. and 4. Arteriæ Malleolares, Externa et Interna,
5. Arteria Tarsi,
6. Arteria Metatarsi,
7. Arteria Pollicis vel Superficialis,
8. Arteria Communicans vel Profunda.

POSTERIOR TIBIAL ARTERY.

This vessel passes upon the posterior part of the leg to the space between the two origins of the abductor pollicis. In this course it lies upon the tibialis posticus and flexor longus communis muscles, and is covered by the deep layer of fascia, the superficial muscles and fascia, and the integuments. As it passes behind the inner ankle, the tendons of the tibialis posticus and extensor communis run close to the malleolar process, then the artery, veins, and nerve, and lastly the tendon of the flexor pollicis. Many muscular twigs arise; the only branch of importance given off by this vessel is, the

Arteria Peronæa, which at the lower part of the
leg subdivides into two branches,
Arteriæ Peroneæ, Anterior et Posterior.

PLANTAR ARTERIES.

Between the two origins of the abductor pollicis the posterior tibial artery divides into the internal and external plantar arteries. The inner of these branches is small, and runs above the abductor pollicis to supply the inner side of the foot. The external plantar artery is much larger and more deeply placed among the muscles in the sole of the foot; it forms an arch by passing, at first, towards the base of the fifth metatarsal bone, then inwards, to the space between the first and second bones; from it several branches arise to supply these muscles, and also *four digital arteries,* which supply the outer side of the second, and the whole of the three outer toes with blood; the great and the inner side of the second toe are supplied by the anterior tibial artery.

INOSCULATION OF ARTERIES.

Before passing from the arteries it may be advantageous to reflect for a few moments upon what branches the maintenance of the circulation must principally depend, in case the main trunk becomes obliterated. Now, although those arteries, which are of sufficient size and regularity of origin and distribution to have received names, must be of infinite importance, and ought always to be most carefully considered by the anatomist and surgeon, as those which must be chiefly relied upon for carrying forward the blood; yet it should never be forgotten, that in every part of the body, and in almost every tissue, there is a constant and intimate connection, by means of the free inosculation of blood vessels, which, though individually small in the natural state of parts, must, even then, when taken collectively, be of the greatest use in the proper conveyance of blood; but when the main channel becomes obstructed, these small vessels become so much enlarged as to play, scarcely a secondary part, in carrying the blood to the parts beyond the obstruction. It must also be borne in mind that, when a ligature is placed upon a large artery, the obliteration does not generally extend farther than the part from whence the next large branch arises.

If the Arteria Innominata should become obliterated, the right side of the head and neck, and the right upper extremity must, for their supply of blood, depend entirely upon the vessels of the other side.

Thus, the superficial parts of the face, head, and neck, will be supplied through the junction of the branches of the two external carotids; while the brain, &c., will be as freely supplied as before, in consequence of the very free communication between the vessels of opposite sides through the circle of Willis; by these channels the right internal, external, and common carotids will be filled. The right subclavian will also become filled; principally from the vertebral, the inferior thyroid, the deep cervical, the internal mammary, and the superior intercostal branches, conveying the blood into it which they receive from the various arteries with which they inosculate.

Should the Carotid and Subclavian on the left side by any chance become obliterated, the communication would be through the same vessels as if the innominata were obstructed, only the blood would flow from right to left, instead of from left to right; except that which passes through the intercostal and mammary arteries, which inosculate principally with vessels on the same side of the body, and consequently are only concerned in those cases where the obstruction occurs in the subclavian from which they arise.

If the obstruction occurs in either the Common Carotid or the Subclavian, in the first stage of their course, before they have given off any branches, and especially in the latter vessel; then, not only would blood flow from the opposite side, but the communication between the branches of the subclavian and external carotid of the same side is so extensive that much blood would necessarily pass from one vessel into the other.

Thus, if the common carotid or trunk of the external carotid be obliterated, then blood will pass into it from the branches of the opposite external and internal carotids, and from the inferior thyroid of the opposite side; also from the inferior thyroid, ascending cervical, and superficial cervical branches of the same side. If it be the subclavian in the first stage of its course which is obliterated, then the blood will find its way into the vessel beyond this point, by the inferior thyroid anastomosing with the two thyroid arteries of the opposite side and the superior thyroid of the same side; the ascending, superficial, and deep cervical branches, will convey blood from the carotid of the same side; the internal mammary and the superior intercostal, from the branches of the thoracic aorta, and even from the deep epigastric artery;

and above all, the vertebral will asist in keeping up the supply through the vessels of the brain.

If the Subclavian artery is closed on the outer side of the scalenus muscle, the communication will be principally through the subdivisions of the suprascapular and transverse cervical arteries, two branches of the thyroid axis, which form a complete chain of inosculations round the shoulder, with the subscapular, the thoracic, and the circumflex arteries; or should the obstruction involve the origins of these latter vessels, by affecting the axillary also, then the former would pour their blood into the branches of them, and these again into the profunda and muscular ramifications of the brachial artery.

If the Brachial Artery be tied, then the inosculation between the thoracic, circumflex, and subscapular branches, and those of the two profundæ, and the numerous muscular twigs of the brachial artery, and these again with the four recurrent arteries at the elbow, is so free as to convey the blood almost as readily as through the usual channel. And so frequent is the union between branches of the ulnar and radial arteries in the fore-arm and hand, that, in order to prevent the flow of blood through any particular portion of either of these vessels, it is necessary to tie it at both ends.

It is scarcely probable that any complete obstruction can take place in either the Thoracic or in the Abdominal Aorta above the origin of the inferior mesenteric artery, without death being the consequence, but below this point it appears to be by no means an impossibility to place a ligature round the aorta, and the circulation in the inferior extremities still go on.*

If the Aorta be obliterated below the inferior mesenteric artery, the blood will flow into the iliacs, by the chain of inosculations upon the abdominal and pelvic viscera, through the ramifications of the superior and inferior mesenteric, particularly the latter, and the spermatic arteries, with the visceral branches of the internal iliacs: by the lumbar arteries with the ilio lumbar, circumflex ilii, and gluteal arteries: and by the internal epigastric with the internal mammary from the subclavian.

Should the Common or Internal Iliac be tied in addition to the branches mentioned above, the flow of blood through the exceedingly numerous inosculations between the visceral branches of the opposite iliacs would be very considerable. If the External Iliac be obstructed, the communication would be free and direct, through the internal mammary, with the epigastric artery: the circumflex ilii with the ilio-lumbar and lumbar: the obturator and internal pudic, with the internal circumflex and external pudic: and the gluteal and ischiadic, with the external circumflex and perforating branches of the profunda.

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* On the 11th of August, 1834, I tied the right femoral artery in a young dog; on the 15th, the left common carotid; on the 19th, the right axillary; on the 22nd, the left external iliac; on the 26th, the right carotid low down; on the 1st of September, the left brachial; on the 9th, not being quite satisfied that I had secured the right carotid, I tied it again high up; on the 16th the aorta was tied, just above its bifurcation. After more than a year from this time the dog was killed; unfortunately the person who undertook to inject it, neglected to immerse the body in warm water, so that the wax was scarcely forced into any of the vessels; this was not discovered until after it was too late to be remedied; it was, however, found on careful examination, that all the ligatures had been properly and securely placed.

When the obstruction takes place in the Femoral below the profunda, as in the ordinary operation for popliteal aneurism, all the branches of the profunda are free, and pour their blood into branches of the anastomotica magna, the tibial recurrent, the superior muscular branches, and the articular branches of the popliteal.

In the leg and foot, as in the fore-arm and hand, the communication is so free, that to prevent the blood from entering into any given portion of these vessels, it is necessary to tie it at both ends.

VEINS.

The venous system consists of four sets of vessels; 1st. The Deep, which accompany the arteries; 2nd. The Superficial, which run immediately beneath the skin; 3rd. The Sinuses of the Brain; and, 4th. The Portal System: all which ultimately open into the two venæ cavæ.

The deep veins of the head and neck, the vena azygos, the pelvic veins, and the branches of the portal system, are not furnished with valves; the other veins contain many, particularly those of the extremities.

DEEP VEINS.

All the arteries of large size, as the axillary, carotid, femoral, &c., are accompanied by a single vein, while the smaller arteries have two veins each; the course of them is identical with that of the corresponding arteries.

SINUSES OF THE BRAIN.

The veins of the brain do not accompany the arteries, but are enclosed between the layers of the dura mater, and are called sinuses; they are fifteen in number.

The Superior and Inferior Longitudinal Sinuses; the first is much the larger; it commences at the crista galli, and runs along the convex edge of the falx major; the latter passes along its concave edge, and opens into the straight sinus.

The Straight Sinus is formed by the inferior longitudinal sinus, and the veins of Galen which return the blood from the inner surface of the brain; it runs upon the tentorium between the layers of the base of the falx major.

The Two Cerebellic Sinuses run in the margins of the falx minor.

The Two Large Lateral Sinuses are situated at the convex margin of the tentorium.

The Two Cavernous Sinuses are placed at the side of the sella turcica; they commence from the ophthalmic veins, and open into the superior and inferior petrosal sinuses on each side.

The Circular Sinus connects the two cavernous sinuses.

The Petrosal Sinuses consist of a superior and an inferior on each side the cranium; they commence at the apex of the petrosal bone, from the termination of the cavernous sinus; the superior runs along its superior ridge, and opens into the lateral sinus, as this passes on the inner side of the mastoid portion of the temporal bone; the inferior runs along the inferior angle of the petrous bone, and opens into the lateral sinus as it is about to leave the cranium.

The Transverse Sinus connects the two inferior petrosal sinuses, across the basilar process of the occipital bone.

The torcular Herophili is placed opposite to the tuberosity of the occipital bone, and is a sort of pouch, where the superior longitudinal, the straight, and the two cerebellic sinuses pour their blood, which the two lateral convey away, so that six sinuses open into it.

The Lateral Sinus on each side passes out of the cranium, through the posterior lacerated opening, and takes the name of Internal Jugular Vein; this accompanies the carotid artery, and in its course down the neck receives part of the facial vein, the laryngeal, the thyroideal, and many muscular branches. Opposite the sterno-clavicular articulation the internal jugular and subclavian veins join, to form the vena innominata. The principal of the superficial cervical veins is the External Jugular, which commences in the parotid gland by the union of the temporal and the internal maxillary veins; near the angle of the jaw a branch of the facial vein joins it. The external jugular passes down the neck over the sterno-mastoid muscle, parallel with the fibres of the platysma myoides, and opens, behind the clavicle, into the subclavian vein.

The superficial veins of the fore-arm are three, the Cephalic, the Basilic, and the Median.

The Cephalic runs along the outer side of the fore-arm and arm to near the shoulder; it commences on the radial side of the dorsum of the hand, and between the great pectoral and deltoid muscles it joins the axillary vein.

The Basilic Vein commences on the ulnar side of the fore-arm, along which it runs; it passes over the inner condyle, and ascends to the upper part of the arm, where it joins one of the deep brachial veins.

The Median Vein commences in the palm of the hand; it runs upon the middle of the fore-arm to the bend of the elbow, where it divides into two branches, which join the other two veins (the median cephalic and median basilic); sometimes a third branch joins one of the deep veins.

The Axillary Vein receives the veins which correspond to the arterial branches given off by the axillary artery; it passes upwards, before the artery, and under the clavicle, where it is called Subclavian; this is separated from the artery by the anterior scalenus muscle, and having received numerous branches, it forms, with the internal jugular, the vena innominata.

The Vena Innominata on the right side is a short trunk: that on the left is much longer, and passes across the thorax, anterior to the trachea and to the origins of the three large arteries; having received several branches from the mediastinum and the thyroid gland, it joins the vein of the right side. The junction of the two venæ innominatæ is posterior to the cartilage of the first right rib, and forms the vena cava descendens.

The Vena Cava Descendens very soon enters the pericardium, anterior to the root of the right lung, and after a short course opens into the right auricle; immediately as it enters the pericardium it receives the vena azygos, which winds round the root of the right lung.

The Vena Azygos commences on the first lumbar vertebra, passes through the aortic opening in the diaphragm, and conveys the blood which has circulated in the thoracic parietes.

The principal superficial veins of the lower extremity are two, the GREATER AND LESSER SAPHENA. The latter commences on the outer side of the dorsum of the foot, passes behind the outer ankle, and runs along the outer side of the leg to the popliteal space, where it opens into the popliteal vein. The greater saphena begins on the inner side of the foot, passes over the internal malleolus, and along the inner side of the leg, then behind the internal condyle, and mounts upon the inner and fore part of the thigh, to the saphenic opening in the fascia lata, where it joins the femoral vein.

The veins which accompany the anterior and posterior tibial arteries unite together in the ham to form the POPLITEAL vein, which is somewhat superficial and external to the artery; having passed through the opening in the adductor muscle to the fore part of the thigh, it constitutes the FEMORAL VEIN. At the groin, as this passes under poupart's ligament, it becomes the EXTERNAL ILIAC, which lies to the inner side of the artery, having, in its passage up the thigh, gradually acquired this position.

The INTERNAL AND EXTERNAL ILIAC VEINS, with their branches, correspond to their respective arteries; they unite upon the sacro-iliac synchondrosis to form the COMMON ILIAC vein.

The left common iliac vein is somewhat longer than the right, and passes under the right common iliac artery, to join with the right vein at the lower edge of the fourth lumbar vertebra; this junction forms the ascending cava.

The VENA CAVA ASCENDENS passes on the right of the aorta, upon the left psoas muscle, and the left crus of the diaphragm, through a fissure in the liver, to the large tendinous opening of the diaphragm; having traversed which, it immediately opens into the right auricle. In this course it receives the Middle Sacral, Lumbar, Spermatic, Renal, Hepatic, and Phrenic Veins.

VENA PORTÆ.

The Vena Portæ in many respects resembles an artery, for though it contains venous blood, yet, unlike all other veins, it conveys the blood for minute distribution. All the blood which has circulated through the chylopoietic viscera, except the liver, by the three great arteries which arise from the abdominal aorta, viz; the celiac axis, and the superior and inferior mesenteric arteries, is poured into it. Within the root of the meso-colon, upon the second dorsal vertebra, the INFERIOR AND SUPERIOR MESENTERIC VEINS join, the trunk passes upwards with the superior mesenteric artery behind the pancreas, where it meets with the large SPLENIC VEIN, which returns the blood from the stomach, spleen, pancreas, and duodenum. The union of these two veins constitutes the VENA PORTÆ; this takes a transverse direction before the aorta, and behind the pancreas; it reaches the smaller omentum, within the folds of which, it mounts in company with the hepatic duct and artery, (the duct being to the right, the artery to the left, and the vein in the middle, but posterior to both,) surrounded by Glisson's capsule, to the transverse fissure of the liver, where it divides into two branches; to this portion of the vein the term sinus of the vena portæ is given; one branch enters into the right, the other into the left lobe of the liver, to be distributed with the branches of the hepatic artery and duct.

The blood thus circulated through the liver re-enters the general system by the hepatic veins.

FŒTAL CIRCULATION.

It may be well to notice the chief peculiarities of the fœtal circulation, which arise from the blood being neither formed nor aërated within the body of the child; but being conveyed from the mother by the umbilical vein, which enters through the umbilical opening, and passes along the falciform ligament of the liver to the horizontal fissure; where it gives off branches to the right and left lobes, but particularly to the latter, which at this period of life is of considerable size: having arrived at the transverse fissure it divides into two branches; the right one is the larger, and joins the vena portæ, of which it makes a component part at this period of life. The left branch of the umbilical vein passes along the posterior portion of the longitudinal fissure, between the left and spigelean lobes, it constitutes the *Ductus Venosus,* and opens into the hepatic veins just as these are entering into the vena cava, where it meets that part of the blood which has circulated through the liver by the vena portæ.

Both vena cavæ, as in the adult, open into the right auricle, which contracts and propels a portion of its contents into the right ventricle, through the auriculo-ventricular opening; but the largest portion passes at once from the right into the left auricle through the foramen ovale. The younger the fœtus the greater is the proportion of blood sent, through the foramen ovale, directly into the left auricle; and the position of the Eustachian Valve, with regard to the opening of the inferior cava, renders it tolerably certain, that it is principally the blood from this vessel which is so directed.

From the right ventricle the blood is forced into the pulmonary artery, which divides into two small branches, the right and left pulmonary arteries, and one large branch, the *Ductus Arteriosus;* through the latter the greater part of the blood passes directly into the aorta, while that smaller part which enters the pulmonary arteries and passes through the lungs, is returned by the pulmonary veins to the left auricle: it there mingles with that sent through the foramen ovale, with which it passes into the left ventricle, through the auriculo-ventricular opening; the valve of the foramen ovale not allowing blood to pass from the left into the right auricle; from the ventricle it is propelled into the aorta.

The aorta distributes its branches as in the adult, but in the iliacs there is a remarkable difference. In the adult the external iliac artery is larger than the internal, in the fœtus the contrary obtains. The internal iliac runs along the brim of the pelvis, and passes up the side of the bladder under the name of hypogastric or umbilical, approaches its fellow of the opposite side, and escapes through the umbilicus. The two arteries twine round the vein in the chord, and having arrived at the placenta, they distribute the blood through it by numerous branches. It will be observed that the umbilical vein serves the office of an artery, while the two umbilical arteries in function resemble veins.

NERVES.

The nerves of the human body are usually considered as belonging to two distinct systems: 1st.—Those which are for the purpose of volition, motion, and sensation whether general or particular, and which are all connected with the brain or spinal marrow;—constituting the Cerebro-spinal System; the nerves of relation, or those by which we are connected with external things: 2nd.—Those which are supposed more particularly to preside over secretion, assimilation, &c.;—constituting the Ganglionic or Sympathetic System; the nerves of organic or vegetative life.

* The nerves of the cerebro-spinal system are

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* I speak of the attachment of nerves, in preference either to the old method of considering all nerves as arising from the brain and spinal marrow, or that which is now gaining ground, of describing the nerves of motion as arising from those of sensation as inserted into these parts; for as the nerves of motion, equally with those of sensation, are found throughout the body altogether independent of the central masses, as seen in acephalous monsters, it is, in point of fact, as incorrect to speak of the one, as arising from the brain or spinal marrow, as of the other; although I readily allow the function of the two orders of nerves is more studied in the latter than in the former.

As it is my purpose at present to avoid physiological discuscommonly divided into those attached to the brain, and those attached to the spinal marrow.

CEREBRAL NERVES.

Some authors speak of nine, others of eleven or twelve pairs of cerebral nerves, all understanding the same nerves, but adopting a different numerical classification; the latter I consider more correct.

Nine pairs, (commencing anteriorly).

1. Olfactory,
2. Optic,
3. Common Motor Nerve of the Eye,
4. Trochleator or Pathetic,
5. Trifacial or Trigeminal,
6. Abducent, or External Motor of the Eye,
7. Portio Dura or Facial, and the Portio Mollis or Auditory Nerve,
8. Glosso Pharyngeal, Pneumo Gastric, and Spinal Accessory,
9. Lingual or Hypo-Glossal.

sions, and simply to state facts as briefly as possible, I give the attachment of nerves as usually found in recent anatomical works, and which are very evident to the eye, although, from investigations in which I have been long engaged, and from the late work of Mr. Solly, I am convinced that the nervous fibrilæ may be traced much farther into the central masses than is generally supposed.

Twelve pairs.

1. Olfactory,
2. Optic,
3. Motor Oculi,
4. Pathetic,
5. Trifacial,
6. Abducent,
7. Portio Mollis, or Auditory Nerve,
8. Portio Dura, or Facial Nerve,
9. Glosso Pharyngeal,
10. Pneumo Gastric,
11. Lingual,
12. Spinal Accessory.

1. OLFACTORY NERVE.

This nerve has a threefold attachment to the cerebrum; the external and internal of which are fibrous, the middle is cineritious. The external is connected with the anterior commissure of the brain, in the fissure of Sylvius; the internal with the under surface of the corpus callosum; and the middle with the grey matter, in the posterior part of the anterior lobe. From the union of these three roots a tringular cord, about two inches long, is formed. This is lodged in a depression between two convolutions, parallel with the under surface of the longitudinal fissure. Upon the cribriform plate of the ethmoid bone, the nerve terminates in a bulbous enlargement, from whence a great number of fine filaments arise, which pass through the foramina into the nose. This should be regarded as the proper attachment of the nerves themselves; the bulbous enlargement and cord is the *olfactory ganglion or tubercle.*

The olfactory filaments are lost in the pituitary membrane lining the nose, and principally in that portion of it which covers the upper part. The branches are arranged into three sets:—1st. An internal, distributed upon the septum nasi; 2nd. An external, distributed upon the turbinated bones; 3rd. A middle, distributed upon the roof of the nostrils.

2. OPTIC NERVE.

The optic nerve is attached to the natis, the testis, and the corpora geniculata; it forms a flattened band, the *Tractus Opticus,* which passes under the crus cerebri, and converging to the median line, anterior to the sella turcica and corpora mammillaria, it forms with its fellow the *Optic Commissure.* This is placed upon the olivary process of the sphenoid bone, and receives some fibres from the tuber cinereum. In the commissure there appears to be a mingling of fibres from the opposite nerves. The nerve leaves the cranium by the foramen opticum with the optic artery, and passes through the sclerotic and choroid coats of the eye to expand into the retina.

3. MOTOR OCULI.

The common motor of the eye is attached to the inner side of the crus cerebri, anterior to the pons Varolii; it passes through the cavernous sinus; as it enters the orbit through the superior lacerated opening, it divides into two branches, a superior or smaller, and an inferior or larger, which supply five of the seven muscles of the orbit. 1. The Superior Branch divides into *two twigs,* one for the levator of the upper eye-lid, and the other for the superior straight muscle of the eye-ball. 2. The Lower or Larger Branch divides into *three twigs*; an *Internal,* for the inner straight muscle; a *Middle,* for the inferior straight; and an *Outer,* for the inferior oblique muscle of the eye-ball: from this latter a minute twig passes to the lenticular ganglion.

4. TROCHLEATOR NERVE.

This nerve is attached to the processus a cerebello ad testem, and to the valve of Vieussens; it runs between the layers of the tentorium to the cavernous sinus, through which it passes, to enter the orbit by the lacerated opening; it is distributed exclusively to the superior oblique muscle.

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5. TRIGEMINAL.

The fifth is a very large nerve; it is apparently attached to the pons Varolii, but may be traced through this, dividing into a larger or posterior fasciculus of fibres, to be connected with the restiform body, or posterior column of the spinal marrow; and a smaller anterior fasciculus, to be connected with the pyramidal body, or anterior column of the spinal marrow. The two fasciculi, closely connected together, run immediately under the tentorium, and over the ridge of the petrosal bone, to its anterior surface, upon which, the posterior fasciculus forms the *Semilunar or Gasserian Ganglion.* The anterior bundle passes between it and the bone, to form part of the inferior maxillary nerve. From the ganglion proceed the three large divisions of the fifth nerve; each of these gives off numerous branches.

1st Division, or Ophthalmic Nerve,
2nd Division, or Superior Maxillary Nerve,
3rd Division, or Inferior Maxillary Nerve.

1*st Division.*

The Ophthalmic Nerve passes through the cavernous sinus, to enter the orbit by the lacerated opening; just before entering the orbit it divides into three branches,

1. Frontal Nerve,
2. Lachrymal Nerve,
3. Nasal Nerve.

The Frontal Nerve subdivides into two twigs, the *Supra-trochlear,* and the *Supra-orbital* nerves.

The Lachrymal Nerve gives off a small twig, which passes through the spheno-maxillary fissure, to join the second division of the fifth; it sends a second twig through the malar bone, which joins the facial; after this the nerve terminates in the lachrymal gland, in the conjunctiva, and in the eye-lids.

The Nasal Nerve divides into four twigs, *one to the Lenticular Ganglion; one or two Ciliary* nerves, the *Infra-trochlear* branch, and the *Proper Nasal* nerve.

2nd Division.

THE SUPERIOR MAXILLARY NERVE escapes from the cranium, through the foramen rotundum into the spheno-maxillary fossa, where it sends off a small twig into the orbit, through the spheno-maxillary fissure, and then it divides into three portions.

1. Alveolar,

2. Infra-orbital,
3. Spheno-palatine.

1st. The Alveolar, or Superior Dental Nerve, passes out of the fossa with the superior dental artery, and supplies the molar and bicuspid teeth of the upper jaw.

2nd. The Infra-orbital branch continues along the floor of the orbit, and appears in the face at the infra-orbital foramen; between the levator labii superioris alaquæ nasi and the levator anguli oris muscles; previous to which, it gives off two twigs,—one passes through the malar bone, the other—the *Anterior Dental,* supplies the incisor and canine teeth by passing down the fore part of the antrum, to the lining membrane of which it also gives branches.

3rd. The Spheno-palatine portion consists of two or three short branches, which join (or form) the small *ganglion* of *Meckel,* or *the Spheno-palatine,* which is placed within the spheno-maxillary fossa: from this ganglion three branches are given off:—

1st. The *Spheno-palatine, or Lateral Nasal,* which enters the nose through the foramen of the same name; 2nd. The *Palato-maxillary, or Posterior Palatine,* which passes to the roof of the mouth by the canal of the same name; some of its branches run as far as the foramen incisivum, where they join with twigs of the lateral nasal nerve, forming a slight enlargement, called the *ganglion of Cloquet;* 3rd. The *Vidian, or Pterygoid,* which passes to the base of the cranium, through the vidian canal, and divides into an *Inferior and Superior* branch. The inferior enters the carotid canal, where it joins, upon the carotid artery, with filaments from the superior cervical ganglion. The superior twig enters the cranium through the anterior lacerated opening, and passes along the hiatus Fallopii, where it joins with the facial nerve, from which it again separates, to pass across the tympanum, under the name of the chorda tympani; it leaves this cavity by the glenoid fissure, to become connected with the gustatory nerve, and finally terminates in the sub-maxillary ganglion, and is distributed to the sub-maxillary gland.

3rd Division.

THE INFERIOR MAXILLARY NERVE.—That portion of the fifth which passes behind the semilunar ganglion forms a part of this nerve; it passes out of the cranium through the foramen ovale, and is, at its exit, placed between the tensor palati and the pterygoideus externus muscles; it divides into two branches.

1. Superior or External,
2. Inferior or Internal.

1. The External is the smaller branch, and

immediately subdivides into four sets of twigs; the *Deep Temporal, the Masseteric, the Buccal, and the Pterygoid.* These twigs are accompanied by the second set of branches from the internal maxillary artery.

2. The Internal is by far the larger portion, and subdivides into three branches; 1st. The *Auricular Nerve;* 2nd. The *Inferior Dental Nerve,* which as it enters the posterior mental foramen gives off a branch to the mylo-hyoideus; part of this nerve escapes by the mental foramen, between the depressor anguli oris and the depressor labii inferioris; 3. The *Gustatory Nerve* for the tongue.

6. ABDUCENT NERVE.

This nerve is connected with the corpus pyramidale, immediately behind the pons Varolii; it passes through the cavernous sinus, to enter the orbit, between the two heads of the external rectus muscle, to the ocular surface of which, after giving a filament to the lenticular ganglion, it is distributed.

POSITION OF THE NERVES IN THE CAVERNOUS SINUS.

If we take the middle of the cavernous sinus, the position of the four nerves which pass through it, is this, remembering that all of them are external to the artery. Superiorly is the third, then the fourth, next the ophthalmic division of the fifth, and lastly, to the inner side of the fifth and close to the artery, is the sixth nerve. Upon the artery several filaments of the sympathetic nerve are found, which have mounted upon it into the cranium from the superior cervical ganglion; these filaments are connected with the nerves in the sinus, particularly with the fifth and sixth.

As these nerves are about to enter the orbit through the lacerated opening, they have not the same relation to each other as in the middle of the sinus; the third has divided into its two branches, and the fifth into its three. Most superiorly is the fourth nerve, then the frontal branch of the fifth, the upper or smaller division of the third follows, then the lachrymal, next the nasal, below which is the lower branch of the third, and beneath all is the sixth nerve.

LENTICULAR GANGLION.

The Lenticular Ganglion is a very small nervous mass situated within the orbit, on the outer side of the optic nerve, between it and the external rectus muscle; it is supposed to belong to the sympathetic system, and to be formed by small twigs which pass to it, from the sixth, from the lower branch of the third, and from the nasal nerves; which twigs are also supposed to be the identical filaments received in the cavernous sinus, by these three nerves from the sympathetic, and by which the lenticular is put in communication with the first cervical ganglion. The lenticular ganglion gives off the two fasciculi of ciliary nerves; these consist of from ten to twenty filaments; they pierce the sclerotic coat, and are distributed to the ciliary ligament and iris.

7. PORTIO MOLLIS, OR AUDITORY NERVE.

The Portio Mollis and Portio Dura are very closely connected together, but their separate attachments to the brain is evident.

The Auditory Nerve is attached to the floor of the fourth ventricle (calamus scriptorius) by three or four white striæ, and also to the anterior part of the restiform body, immediately below the pons Varolii; it forms a large soft nerve, which enters the internal auditory foramen, where it divides into an anterior branch for the cochlea, and a posterior branch for the vestibule and semicircular canals.

8. PORTIO DURA, OR FACIAL NERVE.

This nerve is attached to the upper part of the tractus respiratorius, between the olivary and restiform bodies, immediately below the inferior edge of the pons; it accompanies the auditory nerve into the internal foramen, but soon separates from it to pass along the canal of Fallopius, which opens externally at the stylo-mastoid foramen; its passage through the petrous bone is very tortuous, to avoid the organ of hearing; it is, while within this canal, that it receives, and again gives off, the vidian or chorda tympani nerve. The facial nerve sends off many branches. While behind the tympanum, two or three minute twigs pass to the small muscles of the ear; on escaping from the stylo-mastoid foramen three branches are given off.

1. Posterior Auricular Nerve,
2. Stylo-hyoid Nerve,
3. Sub-mastoid or Digastric Nerve.

The Facial trunk then enters the parotid gland, passes over the external carotid artery, and over the angle of the jaw; it divides into two branches, an upper or Temporo-facial, and a lower or Cervico-facial, each of which subdivides into three sets of twigs; all these, however, unite so frequently upon the face as to form a complete plexus,—the Parotidean or Pes Anserinus. These twigs of the facial freely communicate with the three divisions of the fifth nerve.

The Temporo-facial twigs are the

1. *Temporal,*

2. *Superior Facial,*
3. *Middle Facial.*

The Cervico-facial twigs are the

1. *Inferior Facial,*
2. *Sub-maxillary.*
3. *Cervical.*

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9. GLOSSO-PHARYNGEAL NERVE.

This is connected, by three or four filaments, with the same tract as the facial nerve, below it, between the olivary and restiform bodies; it leaves the skull through the posterior lacerated opening, and passes down anterior to the jugular vein and the internal carotid artery, between the stylo-glossus and stylo-pharyngeus muscles, to the side and base of the tongue. In this course the glosso-pharyngeal nerve, on leaving the cranium, sends two or three small twigs into the temporal bone; it is then intimately connected with the facial, pneumo-gastric, and sympathetic nerves; as it passes inwards, between the internal and external carotids, it gives off many filaments, which, uniting with the pharyngeal branch of the pneumo-gastric, constitute the *Pharyngeal Plexus.* The nerve terminates by its branches supplying the muscles and mucous membrane of the root of the tongue, the fauces, and the pharynx.

10. PNEUMO-GASTRIC NERVE.

The Par Vagum is connected by eight or ten filaments, with the same tract of the medulla oblongata as the last nerve, and immediately below it. This large nerve also leaves the cranium through the lacerated opening, in a distinct fibrous sheath, anterior to the jugular vein; it passes down within the carotid sheath, and enters the thorax, on the left side of the body, anterior to the aorta, on the right side, between the subclavian artery and vein; it descends behind the roots of the lungs, in the posterior mediastinum, and applies itself to the œsophagus, upon which it passes into the abdomen, to be distributed to the stomach. Immediately under the cranium the pneumo-gastric is closely connected with the lingual, spinal accessory, glosso-pharyngeal, and sympathetic nerves; at this point the nerve presents a gangliform enlargement.

The branches given off are very numerous; they are the

1st. Pharyngeal Nerve,

2nd. Superior Laryngeal Nerve,

3rd. Cardiac Branches,

4th. Inferior or Recurrent Laryngeal Nerve, which, on the right side, winds round the subclavian artery; upon the left, round the arch of the aorta, close to the remains of the ductus arteriosus.

5th. A few branches to form the *Anterior Pulmonary Plexus.*

6th. Behind the root of the lung the nerve itself divides and subdivides into numerous branches, to form the *Posterior or Larger Pulmonary Plexus.*

7th. Below the root of the lung most of the branches re-unite and gain the æsophagus upon which they run; those of the left side constituting the *Anterior Œsophageal Plexus*; those of the right side, the *Posterior Œsophageal Plexus.*

8th. Having gained the stomach, the filaments of the two nerves unite upon the larger end of it to form the *Cardiac Plexus,* the twigs from which are distributed upon both surfaces of this organ, between the muscular and mucous coats. Some few twigs of the pneumo-gastric nerves pass into the *Hepatic and Splenic Plexuses.*

11. SPINAL ACCESSORY.

Although this nerve arises from the spinal marrow, and as such, does not properly belong to the cerebral nerves, yet the fact of its origin so closely resembling the two last, and its entering into the cranium to pass again out with them, entitle it to be spoken of in this place. It is attached, by several filaments, to the side of the cervical portion of the spinal marrow, from the second to about the sixth vertebra; (a part, which is considered by Sir C. Bell, to be a continuation of the tractus respiratorius) its filaments are between the anterior and posterior roots of the spinal nerves; it enters the cranium through the foramen magnum, to join the glosso-pharyngeal and pneumo-gastric nerves, with which it passes out through the posterior lacerated opening; it is then closely connected to the lingual, the glosso-pharyngeal, the pneumo-gastric, and the sympathetic nerves; it proceeds outwards, behind the jugular vein, and pierces the posterior edge of the upper third of the sterno-mastoid muscle; it then joins the cervical plexus, and is lost upon the trapezius muscle, to which it is principally distributed.

12. LINGUAL NERVE.

The Lingual Nerve is attached by several filaments (six or eight) to the groove between the olivary and pyramidal bodies; it passes out of the cranium, through the anterior condyloid foramen, when it communicates with the nervous loop of the atlas, with the ninth, tenth, and eleventh pairs of nerves, and also with the sympathetic. It is here behind the internal carotid artery and jugular vein, but descends along their external side; it turns forwards and becomes superficial to both carotids, hooks round the occipital artery, and passes parallel, but superficial, to the lingual artery; it then runs between the hyo-glossus and mylo-hyoideus, as far as the tip of the tongue, to the muscles of which organ it is principally distributed.

The lingual nerve on the fore part of the neck sends off the Descendens Noni and the Thyro-hyoideal branch: the latter is small; the former passes down the neck upon the carotid sheath; at first it lies upon its outer side, then upon the inner; it receives some filaments from the pneumogastric and cervical plexus; it is distributed to the omo-hyoideus, sterno-hyoideus, and sterno-thyroideus muscles.

SPINAL NERVES.

There are thirty pairs of spinal nerves, beside the accessory, each of which is connected to the spinal marrow by a double attachment,—the Anterior or Motor filaments, and the Posterior or Sensatory filaments. The motor filaments are smaller than the sensatory. They are connected with the anterior or motor tract of the spinal marrow at the antero-lateral fissure; this corresponds with the anterior horn of the crescentic-shaped cineritious matter, which is contained within the external white fibrous portion of the medulla spinalis. The sensatory filaments are the larger, and are connected with the posterior or sensatory tract at the posterior lateral fissure, which corresponds with the posterior horn of the crescentic-shaped mass. The ligamentum dentatum is placed between the anterior and posterior filaments; these converge as they proceed obliquely downwards and outwards to the inter-vertebral foramina; within this, the posterior root swells out into a small oval gangliform enlargement, to which the anterior root is closely applied. Immediately to the outer side of this ganglion the two portions are completely united into one cord, constituting the proper spinal nerve.

The nerves having passed out from between the vertebræ, divide into anterior and posterior branches; the latter of which, (except the first and second cervical), are very much smaller than the anterior, and are distributed to the muscles and integuments upon the posterior surface of the body. All the spinal nerves communicate with each other and with the sympathetic.

The spinal nerves are classed according to the vertebræ between which they issue from the canal; thus we have eight cervical, twelve dorsal, five lumbar, and five sacral nerves. The first cervical escapes between the occipital bone and the first vertebra, and is frequently called the sub-occipital, in which case the cervical nerves will be enumerated as only seven.

CERVICAL NERVES.

The First Cervical or Sub-occipital Nerve leaves the spinal canal between the atlas and occipital bone, and like the other spinal nerves divides into a posterior and an anterior branch; these are of nearly equal size, the former is distributed to the small muscles at the back of the head, the latter appears between the rectus capitis anticus minor and rectus lateralis muscles; it joins with the other nerves in this situation, as the par vagum, sympathetic, &c., and is distributed to the muscles of this region; by joining with a branch of the second cervical nerve, it forms a nervous loop round the transverse process of the atlas.

The posterior branch of the second cervical nerve is a considerable trunk, being much larger than the anterior; it passes upwards and backwards, between the obliquus capitis inferior and the complexus muscles; which latter, as well as the trapezius, it pierces and becomes subcutaneous, ramifying upon the back of the scalp with the branches of the occipital artery. It is called the *Great Occipital Nerve.*

CERVICAL PLEXUS.

The Cervical Plexus it situated at the side of the neck, and is formed by the anterior branches of the four (sub-occipital, and three) superior cervical nerves, which unite into loops, from whence branches arise; these are embedded in much loose cellular membrane, between the sterno-mastoideus and the trapezius muscles.

The branches arising from the plexus are divided into an ascending and a descending set.

The *Ascending Set* turn over the posterior edge of the sterno-mastoid muscle, and pass obliquely upwards; three of them are distinguished by names.

1. The Auricular Branch or Ascendens Colli, accompanies the external jugular vein to the parotid gland.

2. The Transverse or Superficial Cervical, passes towards the chin, and joins with the submaxillary branches of the facial.

3. The Small Occipital ascends towards the mastoid process.

The *Descending* branches from the cervical plexus are several, and may be divided into a deep and superficial set; the latter are called from their direction,

1. Supra-clavicular Twigs,
2. Supra-acromial Twigs,
3. Sub-clavicular Twigs.

The deep, are two important nerves, which pass from the lower portion of the plexus, chiefly, but not entirely, from the fourth cervical nerve.

1. The External Respiratory Nerve, which is distributed almost exclusively to the serratus magnus.

2. The Internal Respiratory or Phrenic Nerve, which descends upon the scalenus anticus, and enters

the chest between the subclavian artery and vein; it then passes upon the sides of the pericardium to the diaphragm, where it is distributed.

Two or three filaments from the cervical plexus also pass towards the carotid sheath, to join the descendens noni.

BRACHIAL PLEXUS.

This Plexus is formed by the large anterior branches of the four inferior cervical and the first dorsal nerve; the posterior branches being very small. The nerves emerge between the scalenus medius and anticus muscles; they are placed above, and to the outer side of the subclavian artery, in the small, deep triangular space formed by the omo-hyoideus, the scalenus anticus, and the first rib. At first the fifth and sixth cervical unite, as do the eighth cervical and the first dorsal, leaving the seventh cervical separate; they pass, with different degrees of obliquity, over the first rib, where they all join in a single large flattened cord, and again separate in the axillary space to form the plexus of the same name.

The Axillary Plexus in the middle of the cavity completely surrounds the artery; the branches derived from it are nine in number, or rather, they are arranged into nine sets. The three first are given off from the upper part of the plexus.

1. Thoracic Nerves,
2. Supra-scapular Nerve,
3. Sub-scapular Nerves,
4. Internal Cutaneous Nerve,
5. External Cutaneous Nerve,
6. Median Nerve,
7. Ulnar Nerve,
8. Radial Nerve,
9. Circumflex Nerve.

1. THORACIC NERVES.

These are four or five in number, and accompany the thoracic arteries.

2. SUPRA-SCAPULAR NERVE.

This nerve passes under the posterior ligament of the scapula, the artery passing over; it divides into Supra and Infra-spinal Branches.

3. SUB-SCAPULAR NERVES.

These are three or four in number; they accompany the sub-scapular artery and its branches.

4. INTERNAL CUTANEOUS NERVE.

Below the elbow this nerve becomes cutaneous, and accompanies the basilic vein; it supplies the integuments on the inner side of the fore-arm, down to the wrist and hand.

5. EXTERNAL CUTANEOUS NERVE.

This nerve is also called the musculo-cutaneous, from its piercing the coraco-brachialis muscle, and supplying the muscles on the anterior surface of the humerus; in the fore-arm it becomes cutaneous, and descends with the cephalic vein, on its radial side; it may be traced as far as the thumb.

6. MEDIAN NERVE.

This is a very large nerve; it arises by two roots between which is the brachial artery; at the upper part of the arm this vessel is on the inner side of the nerve, but in the middle of the arm the nerve crosses over the vessel, and at the bend of the elbow lies to its inner side. The nerve descends in the fore-arm between the two layers of muscles, and passes under the annular ligament, where its size is increased; in the palm of the hand it divides into *five digital* branches, to supply the thumb, the first, the second, and the radial side of the third fingers; in this course the nerve gives off the following branches:—

1. Muscular Branches in the arm,
2. Anterior Inter-osseal Nerve,
3. Muscular Branches to the pronators and flexors, but not to the supinator or extensor muscles of the fore-arm;
4. Superficial Branch at the wrist,
5. Five Digital Branches.

7. ULNAR NERVE.

In the arm this nerve descends upon the short head of the triceps, and passes behind the inner condyle, to continue along the fore-arm, on the inner side of the ulnar artery, between the flexor digitorum sublimis and the flexor ulnaris; it passes over the annular ligament into the palm of the hand. In this course the ulnar gives off the following branches:—

1. A few Muscular Branches in the arm,
2. Several Branches to the muscles of the fore-arm,
3. Posterior Ulnar Branches of the wrist, to supply the inner side of the dorsum of the hand,
4. Deep Palmar Branch, to the interossei muscles,
5. Superficial Branch, which subdivides into *three*, to supply the whole of the little finger and the ulnar side of third finger.

8. RADIAL NERVE.

This is the radio or musculo-spiral nerve; it takes a spiral direction round the humerus, passing with the superior profunda artery between the three portions of the triceps muscle; it appears on the outer side of the arm, between the brachialis anticus and the supinator longus muscles, and descends to the elbow, where it divides into the proper radial, and into the inter-osseal nerves.

1. The Radial nerve runs along the fore-arm, on the outer side of the radial artery, and winds round the lower end of the radius, under the supinator longus tendons, to the back of the wrist, where it divides into branches to supply the radial side of the dorsum of the hand and fingers.

2. The Posterior Inter-osseal nerve winds round the head of the radius, upon the supinator brevis muscle, and runs down the fore-arm, with the posterior inter-osseal artery; it divides into branches to supply the extensors and supinators of the fore-arm.

9. CIRCUMFLEX NERVE.

This nerve passes round the humerus in company with the posterior circumflex artery, under the deltoid muscle; it escapes from the axillary space by a large quadrangular opening, formed, externally, by the humerus, internally, by the long head of the triceps, superiorly, by the edge of the sub-scapularis muscle, and inferiorly, by the teres major and latissimus dorsi muscles.

DORSAL NERVES.

There are twelve pairs of dorsal nerves; their posterior branches pass between the transverse processes of the vertebræ to the dorsal muscles. Each anterior branch is joined by one or two filaments from the thoracic ganglions of the sympathetic. The first nerve, the anterior branch of which has already been described as entering into the brachial plexus, is by far the largest; it escapes from the canal between the first and second dorsal vertebræ; the last nerve escapes below the twelfth, and communicates with the first lumbar nerve.

The remaining eleven pairs pass outwards; at first between the external layer of intercostal muscles and pleura; from the angle of the ribs they lie between the two layers of muscles. The nerves not only supply the intercostal muscles, but the upper also supply the integuments and parietes of the thorax, and the inferior assist in supplying the diaphragm and abdominal muscles. The second and third dorsal nerves, as they pass round the thorax, send each a branch across the axillary space to the integuments on the upper and inner part of the arm; these are called the nerves of Wrisburg.

LUMBAR NERVES.

These correspond in number with the lumbar vertebræ; the first receives a branch from the lowest dorsal, the last sends a branch to join the sacral plexus. The posterior branches are small, and escape between the transverse processes to the muscles of the back; the five anterior cords receive twigs from the sympathetic, and unite with each other in the substance of the psoas muscle, to form the lumbar plexus, from which the four following nerves pass off:—

1. Inguino-cutaneous,
2. Anterior Crural,
3. Obturator,
4. Lumbo-sacral.

1. INGUINO-CUTANEOUS.

The inguino-cutaneous consist of three branches, which arise from the two first lumbar nerves. The External passes obliquely over the quadratus lumborum muscle to the middle of the crista of the ilium, where it sends branches to the abdominal muscles, to the outer and upper part of the thigh, and one long branch, the *External Spermatic*, to the spermatic cord and scrotum. The Middle Branch passes along the outer side of the psoas muscle to the superior anterior spinous process of the ilium, where it passes under the crural arch, and is distributed to the integuments of the thigh. The Third or Internal Branch, near poupart's ligament, divides into two twigs; one passes to the thigh exactly over the femoral vessels, the other accompanies the spermatic vessels to the cord.

2. ANTERIOR CRURAL NERVE.

This nerve is of very great size; it arises from the four superior lumbar nerves, and passes downwards, on the outer side of the psoas muscle, between it and the iliacus, and under the fascia iliaca; as it passes beneath poupart's ligament it is about one inch and a half to the outer side of the artery; it divides in the groin into many branches, which are classed into a Superficial and a Deep Set, and supply the muscles of the thigh. One of the latter branches descends with the vessels as far as the opening in the abductor magnus tendon; it then passes between the gracilis and sartorius, over the inner condyle of the knee, and accompanies the saphena vein down the leg, as far as the inner side of the foot, it is called the *Internal Saphenus Nerve*.

3. OBTURATOR NERVE.

This arises principally from the third lumbar nerve; it descends on the inner side of the psoas, near the brim of the pelvis, then passes through the obturator foramen, and, like the artery, divides into an *Internal* and an *External Branch.*

4. LUMBO-SACRAL NERVE.

This large nerve is formed from the fourth and fifth lumbar; it descends into the pelvis, where it divides into two branches; the Communicating, which joins the sacral plexus, and the Superior Gluteal Nerve; this escapes with the gluteal artery through the upper part of the sacral notch, above the pyriformis muscle, and divides into branches to be distributed with the artery to the gluteal muscles.

SACRAL PLEXUS.

This plexus consists of the communicating nerve, and the anterior branches of the five sacral nerves; these escape through the anterior sacral foramina, and, like the other spinal nerves, receive twigs from the sympathetic; the three upper are very large cords. The posterior branches of the sacral nerves are small, they pass backwards through the posterior sacral holes. The sacral plexus is placed anterior to the pyriformis muscle and behind the rectum. The branches of the sacral plexus may be arranged into those which are distributed to the parts within the pelvis, and those which pass out of this cavity; the latter are large, the former are small, and only require enumeration; in the male they consist of two sets of twigs, in the female of four.

Visceral Branches.

1. Hæmorrhoidal,
2. Vesical,
3. Uterine, } *In the female.*
4. Vaginal, }

External or Muscular Branches.

5. Lesser Sciatic,
6. Inferior Gluteal,
7. Pudic,
8. Posterior Cutaneous,
9. Great Sciatic.

5. LESSER SCIATIC NERVE.

This nerve escapes through the larger sciatic notch, below the pyriformis, and runs down between the tuber ischii and the great trochanter. It divides into *Deep Branches* to supply the rotator and coccygeal muscles, and *Superficial* for the ham-string muscles.

6. INFERIOR GLUTEAL NERVE.

This nerve passes out of the pelvis beneath the pyriformis muscle, and is principally distributed to the greater glutæus muscle.

7. PUDIC NERVE.

The pudic escapes with the last, but immediately passes round the spine of the ischium, and re-enters the pelvis through the smaller notch. It divides into two branches; the *Inferior* pierces the obturator fascia, and is distributed to the muscles of the perinæum; the *Superior* pierces the suspensory ligament, and passes on to the dorsum of the penis, along which it runs to the glands.

8. POSTERIOR CUTANEOUS NERVE.

This escapes from the pelvis with the two last nerves, and descends under the integuments to the ham and calf of the leg.

9. GREAT SCIATIC NERVE.

The sciatic is by far the largest nerve in the body; it arises from all the sacral nerves, and generally escapes from the pelvis below the pyriformis muscle, but which it sometimes pierces. It lies upon the small rotator and the abductor magnus muscles; it is covered by the ham-string muscles and the fascia lata; at the lower part of the leg it divides into the Peroneal or External, and the Tibial or Internal Branches.

The Peroneal is the smaller of the two nerves; it descends obliquely outwards, behind the external condyle, and winds round the head of the fibula, previous to which, it gives off the *Posterior Cutaneous* branches: it then pierces the peronæus longus muscle, and divides into the *Musculo-cutaneous,* and *Anterior Tibial* nerves.

The *Musculo-cutaneous* nerve passes downwards, between the peronæus longus and the extensor digitorum communis; a little above the ankle it pierces the fascia, and divides into the *External* and *Internal Tarsal* nerves to supply the dorsum of the foot.

The Anterior Tibial nerve passes down between the extensor communis and the tibialis anticus, and runs under the annular ligament to the tarsus, which, with the metatarsus, it assists in supplying; one branch passes as far as the two inner toes, and communicates with the plantar nerves.

The Posterior Tibial nerve is the larger branch; it descends posterior to the poplitæus muscle, where it gives off a cutaneous branch, the *External Saphe-*

nus, which is joined by a branch from the musculo-cutaneous; it runs down upon the outer side of the leg, with the smaller saphena vein, and passes behind the outer ankle to the external side of the foot. The posterior tibial nerve then proceeds downwards, between the deep and superficial layer of muscles, covered by the deep fascia, and on the external side of the artery, to the space between the heel and the inner ankle, where it divides into the internal and external plantar nerves.

The *Internal Plantar* nerve is the larger, (the outer artery is the larger); it passes above the abductor pollicis, and divides into *four digital branches,* which supply the whole of the three internal toes and the inner side of the fourth. The *External Plantar* nerve passes above the flexor brevis communis to the little toe, which, as well as the outer side of the fourth toe and the deep plantar muscles, it supplies.

SYMPATHETIC SYSTEM.

The Sympathetic or Ganglionic System, consists of a series of ganglia arranged on each side the vertebral column, and connected together by nervous cords. From both the ganglia and the connecting cords numerous branches pass off; these are principally distributed to the organs of assimilation and secretion, or pass with the blood vessels; each of the spinal nerves and many of the cerebral nerves, (perhaps all, except those of special sensation) are joined by filaments of the sympathetic. From the frequent union, separation, and re-union of the branches of this system many plexuses are formed; these are variously named, either from their situation, or the nerves which compose them. The two sympathetic nerves are united together, so as to constitute an unbroken chain; superiorly, upon the anterior communicating cerebral artery, by the Ganglion of Ribes; inferiorly, upon the coccyx, by the Ganglion Impar. For the purposes of description, the sympathetic is divided into the Cervical, Thoracic, and Abdominal portions; but besides the ganglia in these regions, several small ganglia are found in the head and face, which are supposed to belong to this system, as the Lenticular, Cloquet's, Meckel's, Arnold's, and Ribes's.

GANGLIA OF THE HEAD.

Five small ganglia are found in the head and face, the larger of these have been described. They communicate with the other parts of the sympathetic system, by means of two or three small filaments which pass upon the internal carotid artery, from the superior cervical ganglion. These filaments form a plexus round the artery, and in the cavernous sinus join the cerebral nerves which pass through it.

1. THE GANGLION OF RIBES is placed upon the small branch which in the inter-cerebral fissure communicates between the two anterior cerebral arteries. This, like Cloquet's, is a single ganglion.

2. The LENTICULAR OR OPHTHALMIC GANGLION is within the orbit, between the optic nerve and the abductor muscle.

3. The SPHENO-PALATINE OR MECKEL'S GANGLION is placed in the spheno-maxillary fossa.

4. The PALATO-MAXILLARY OR CLOQUET'S GANGLION is found in the foramen incisivum.

5. The **Otic or Arnold's Ganglion** is found under the base of the skull, between the foramen ovale and the origin of the circumflexor palati muscle.

CERVICAL PORTION OF THE SYMPATHETIC.

The Cervical Ganglia are three in number on each side of the neck; the superior, the middle, and the inferior.

The **Superior Ganglion** is of a long, oval figure, and is placed behind the internal carotid artery, the glosso-pharyngeal, pneumo-gastric, spinal-accessory, and lingual nerves, with all which it is very intimately connected; it lies upon the rectus capitis anticus major muscle, and extends over the second vertebra. The branches arising from it are classed into superior, internal, external, anterior, and inferior.

1. Superior Branches, which generally consist of two or three twigs; they mount upon the carotid artery into the cranium.

2. Internal Branches, these are numerous; they enter into the pharyngeal plexus, which they assist in forming, and one or two join the superior laryngeal nerve.

3. External Branches, which join the superior cervical nerves.

4. Anterior Branches, which are very numerous; they join with the pneumo-gastric and facial nerves, and form plexuses round the divisions of the external carotid artery.

5. Inferior or Descending Branches, are those which connect the first to the second ganglion, and also one or two filaments which constitute the superior cardiac nerve.

The Middle Cervical Ganglion is not always present, it is smaller than the superior, and is placed upon the fifth vertebra, behind the carotid, near the spot where the superior thyroideal artery passes posterior to the sheath: it sends

1. Internal Branches to the larynx and œsophagus.

2. External Branches to the cervical nerves and their divisions.

3. Anterior Branches to form the middle cardiac nerve.

4. Inferior Branches to connect it with the inferior ganglion.

The Inferior Cervical Ganglion is found between the scalenus anticus and the longus colli muscles, near the transverse process of the seventh vertebra, and immediately behind the origin of the vertebral artery: its branches are

1. Superior Branches, which are numerous, and pass with the vertebral artery.

2. Internal Branches; these join the pneumogastric and recurrent laryngeal nerves.

3. External Branches, some of which form a plexus round the subclavian artery, others, which join the inferior cervical nerves.

4. Inferior Branches, which join the first thoracic ganglion.

5. Inferior Cardiac Nerves.

CARDIAC NERVES AND PLEXUS.

The three cardiac nerves are not of equal size on each side the body. The right middle cardiac is usually the largest of the nerves, while that of the left side is often small or wanting; on the contrary, the inferior left is considerable, and the inferior right small. These nerves all descend into the chest and form a most intricate net-work, which is considerably increased by branches from the pneumo-gastric and recurrent laryngeal nerves. The filaments pass along the three great arteries to the arch of the aorta; most of them posterior to the vessel, between it and the bifurcation of the trachea, to join the posterior cardiac plexus. A small number of filaments pass anterior to the aorta; these constitute the Anterior Cardiac Plexus.

The Posterior Cardiac Plexus or Ganglion is placed between the aorta, the right pulmonary artery, and the trachea; it forms a most complicated web, which is increased by branches from the superior thoracic ganglion and the pulmonary plexuses; within the meshes of this web several minute ganglia are enclosed. From the cardiac plexus very many branches pass with the coronary arteries to the ventricles, others upon the cava to the auricles, some accompany the pulmonary arteries to the lungs, and others mount upon the aorta and ductus arteriosus.

THORACIC PORTION OF THE SYMPATHETIC.

The Sympathetic, in the chest, consists of a chain of eleven or twelve ganglia on each side of the vertebral column, situated either upon, or between the heads of the ribs; they are covered by the pleura, being just external to the posterior mediastinum. Sometimes the last cervical and first thoracic ganglia are confounded together; the ganglia are connected by one or two filaments. From each, two or three branches pass outwards to join the spinal nerves, and other small branches pass inwards, across the vertebral column, from whence filaments enter the pulmonary and cardiac plexuses, and others accompany the aorta and œsophagus. Two important nerves arise on each side from the thoracic ganglia,—the greater and smaller splanchnic nerves.

The **Greater Splanchnic Nerve** is formed by the union of filaments from the sixth, seventh, eighth, ninth, and tenth ganglia; these all pass inwards and unite in one cord upon the eleventh dorsal vertebra. The cord enters the abdomen either through the aortic opening in the diaphragm, or separated from it by a few fibres of the crus. It terminates in the semilunar ganglion.

The **Smaller Splanchnic Nerve** is formed by filaments from the two last ganglia; it pierces the crus of the diaphragm, and divides into two branches, one of which joins the greater splanchnic nerve; the other enters the renal plexus.

ABDOMINAL PORTION OF THE SYMPATHETIC.

The branches of this portion of the sympathetic are derived from the chain of ganglia placed upon the lumbar and sacral portion of the vertebral column, and from the splanchnic nerves; those from the latter form numerous and most intricate plexiform arrangements.

The **Lumbar Ganglia** are four or five on each side the vertebræ, they are internal to the psoas muscle; from each ganglion one or two branches pass through the muscle to join the lumbar nerves, others pass inwards and form a plexus upon the aorta ; they also send branches to enter the various plexuses, formed principally from the solar plexus. The lumbar ganglia are connected to each other by small filaments, the first being united to the last thoracic ganglion, and the last lumbar being connected to the first sacral.

The Sacral Ganglia are three or four in number ; they occupy the anterior sacral holes, consequently converge as they pass downwards ; they all send branches to communicate with the sacral nerves, and to enter into the hypogastric and pelvic plexuses, which they assist in forming.

The inferior ganglion on each side sends branches, which, in the median line, on the sacro-coccygeal ligament, unite in a small ganglion (Ganglion Impar); thus completing the chain inferiorly, as the ganglion of Ribes does superiorly.

SEMILUNAR GANGLION AND ITS BRANCHES.

The Semilunar is by far the largest of the sympathetic ganglia, it is situated upon the crus of the diaphragm, to the inner side of the supra-renal capsule, and lies partly upon the aorta ; the two semilunar ganglia communicate with each other by many filaments, which form an areolated web studded with minute ganglia, in the midst of which the cœliac axis is situated; this is the SOLAR PLEXUS: it is placed upon the aorta and above the pancreas; it receives branches from both pneumo-gastric nerves.

From the solar plexus filaments pass upon the three divisions of the cœliac axis, which are respectively named the GASTRIC, the SPLENIC, and the HEPATIC plexuses; numerous other filaments pass between the layers of the mesentery, with the superior mesenteric artery, to form the SUPERIOR MESENTERIC plexus; while others again pass with each renal artery, constituting the RENAL plexus, which, on each side, receives a part of the smaller splanchnic nerve: the renal plexus gives off the SPERMATIC plexus. The filaments which are found at the root of the meso-colon form the INFERIOR MESENTERIC plexus, which, like the others, accompanies the ramifications of the blood vessels of the same name. Many filaments pass from the inferior mesenteric plexus into the pelvis, these, with branches from the lumbar and sacral ganglia, form plexuses round the divisions of the internal iliac artery, constituting the HYPOGASTRIC and PELVIC plexuses.

* ANALOGY BETWEEN THE VESSELS AND NERVES OF THE UPPER AND LOWER EXTREMITIES.

ARTERIES.

The very close and interesting resemblance between the vessels and nerves of the upper and lower extremities, cannot have failed to have attracted the attention of the student.

The Brachial artery in the arm corresponds with the Femoral in the thigh. The Radial of the fore-arm, which supplies the dorsum of the hand, the whole of the thumb, and the radial side of the index

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* In making this comparison the fore-arm should not be in a state of supination, as it is usually supposed to be in descriptive anatomy, but completely prone, with the hand placed upon the palm; when the analogy, not only in the vessels and nerves, but also in the muscles, becomes much stronger than in a state of supination. It will then be evident, that the terms flexion and extension of the wrist joint, might with propriety be reversed in their application, and what is usually called extension be denominated flexion; at least if flexion be the active state (so to speak) of a limb, and extension be the return of it to a straight or to a line but slightly bent with the part above; as the motion of the hand backwards, is, I believe, both more extensive, important, and useful, than it is in the forward direction.

finger, has its analogue in the Anterior Tibial, which supplies the dorsum of the foot, the whole of the great toe, and the tibial side of the second. The Ulna, with its inter-osseal branch, supplying the flexors of the fingers, and by the palmar arch the whole of the three inner fingers and ulnar side of the index, has its counterpart in the Posterior Tibial, which, with its peroneal branch supplies the flexors of the toes, and by its outer plantar branch, forming the Plantar Arch, the whole of the three outer toes, and fibular side of the second toe.

NERVES.

The analogy between the nerves of the upper and lower extremities is perhaps not altogether so striking as that of the arteries, but it is still very evident. Thus the External Cutaneous nerve (if the hand be prone, the internal) of the fore-arm, accompanies the cephalic vein to the radial side of the hand, the Inner or Greater Saphenus nerve accompanies the internal saphena vein (the cephalic of the leg) to the tibial side of the foot. The Internal Cutaneous nerve (external, in a state of pronation) of the fore-arm accompanies the basilic vein to the ulnar side of the hand; the External Saphenus nerve, accompanies the smaller saphena vein (the basilic of the leg) to the fibular side of the foot.

The Radio-spiral nerve at the bend of the elbow divides into the radial and the posterior inter-osseal nerves to supply the extensors of the wrist, (flexors in the state of pronation) the extensors of the fingers, and the dorsum of the hand. The Peroneal at the head of the fibula divides into the Musculo-cutaneous and Anterior Tibial nerves to supply the flexors of the ankle, the extensors of the toes, and the dorsum of the foot.

The Median and Ulnar nerves supply the flexors (extensors in a state of pronation) of the wrist and the flexors of the fingers; the Median also furnishes branches for the whole of the thumb, the first and second fingers, and the radial side of the third; the Ulnar for the ulnar side of the third, and the whole of the fourth finger. In the leg, the Posterior Tibial supplies the extensors of the ankle and the flexors of the toes; also, by means of the Internal Plantar branch (the Median), the whole of the three inner toes, and the tibial side of the fourth; by the external Plantar (the Ulnar) the fibular side of the fourth, and the whole of the fifth toes.

Were it in this place desirable to do so, this comparison might easily be carried out more into detail, so as to comprehend even the smaller branches of the blood vessels and nerves.

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